MARCH 11, 1937 FIRST AERO WEEKLY IN THE WORLD

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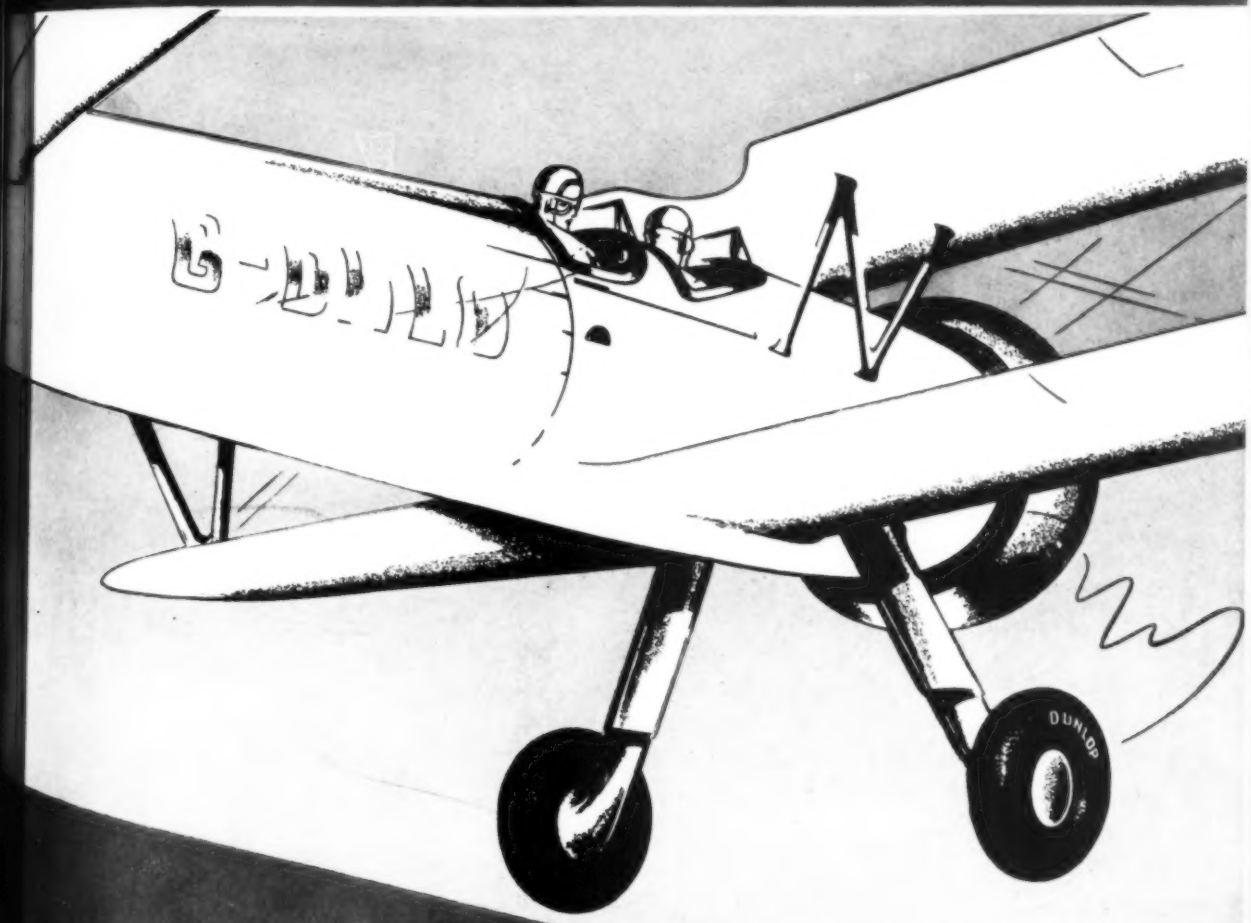

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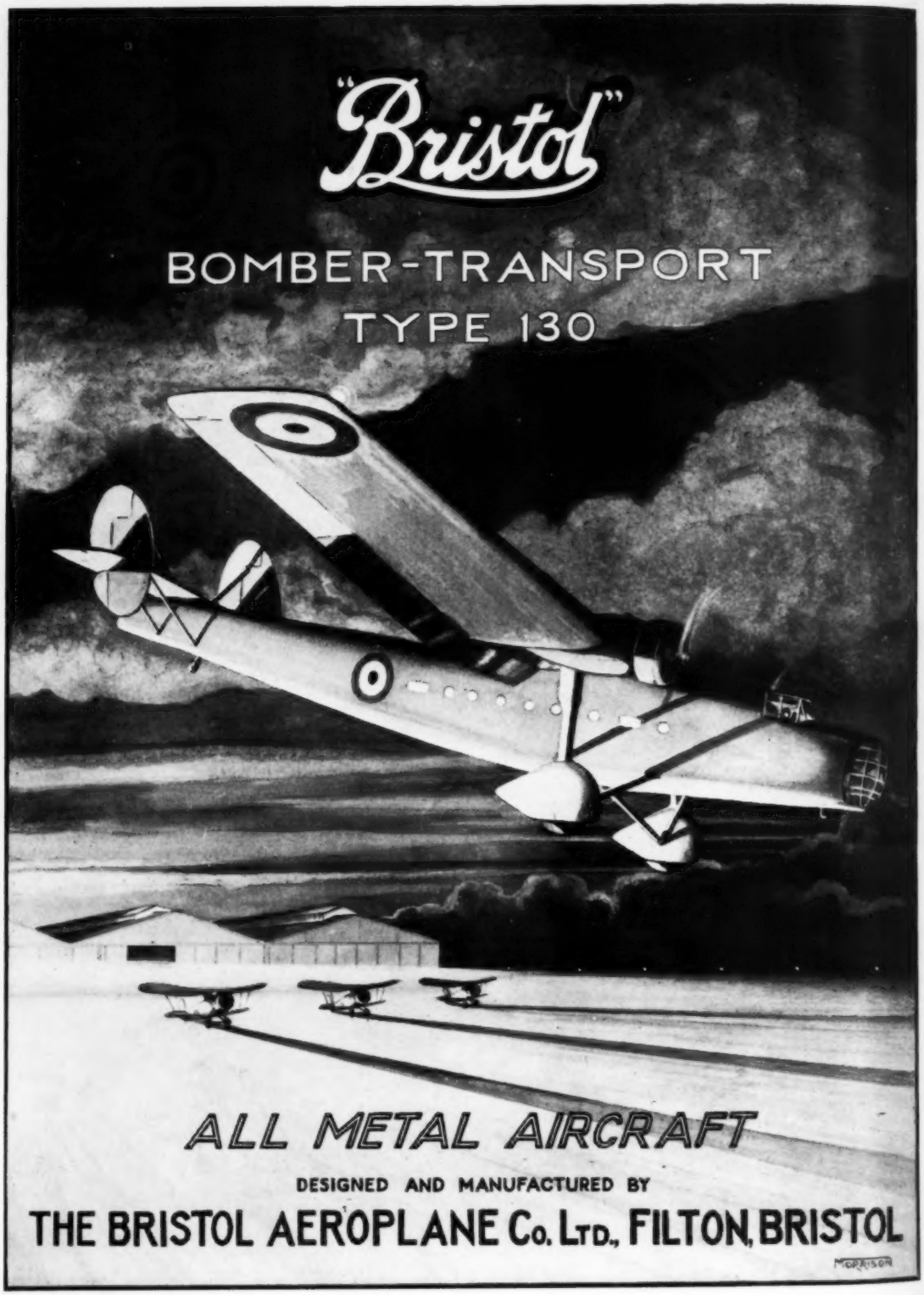
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The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH

Chief Photographer JOHN YOXALL

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1

Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (50 lines).

HERTFORD ST., COVENTRY. Telegrams: Autocar, Coventry. Telephone: Coventry 5210.

GUILDHALL BUILDINGS, NAVIGATION ST., BIRMINGHAM, 2. Telegrams: Autopress, Birmingham. Telephone: Midland 2971.

260, DEANSGATE, MANCHESTER, 3. Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412.

26B, RENFIELD ST., GLASGOW, C.2. Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

SUBSCRIPTION RATES: Home and Canada: Year, £1 11 0. 6 months, 16s. 6d. 3 months, 8s. 6d. Other Countries: Year, £1 16 0. 6 months, 18s. 0d. 3 months, 9s. 0d.

No 1472. Vol. XXXI. MARCH 11, 1937. Thursdays, Price 6d.

Wise Spending

MAGNITUDE is the keynote of the Air Estimates issued last week. To those who have studied and condoned the meagre sums spent on the air for many years past, a provision of eighty-two and a half million pounds seems a staggering total. Incidentally, the odd two and a half millions are for civil flying. Of this great total the taxpayer must find fifty-six and a half millions this year, while twenty-six millions will be provided by borrowing. The income-tax payer in particular will be grateful to the Chancellor of the Exchequer for this last item of mercy. It is only right that future generations should share in the burden of keeping the country and Empire safe and of taking steps which must go far to preserve the peace of the world.

Apart from the mere size of the sums involved, the Estimates contain nothing very startling, for practically all the details of the expansion on which the money is to be spent have been published already. This publicity was undeniably wise, for it was necessary to take the country into the confidence of the Government and let the people know what was to be done. In past years there have usually been some revelations made in the Air Estimates, and one can recall the excitement and gratification with which an announcement was greeted to the effect that perhaps two new squadrons were to be raised. Now new squadrons appear with such frequency that it takes an effort to keep count of them, and yet the programme is somewhat in arrears. The general result of all this publicity is that the Estimates contain no revelations at all. The public already knew all that is to be done, and the Estimates only state the cost.

The position is clearly summed up in the Memorandum which accompanies the Estimates. Within three weeks from now the Royal Air Force will consist of 100 squadrons stationed at Home (exclusive of the Auxiliary Air Force, which will presently comprise twenty squadrons), the equivalent of twenty squadrons in the Fleet Air Arm, and twenty-six squadrons serving overseas. The strength of the Force will have risen to 4,850 officers and 51,000 airmen, exclusive of those serving in India, and likewise exclusive of the Auxiliaries. These various exclusions and inclusions make it rather hard for the plain taxpayer to know exactly what air strength he is getting for his money, because when the Estimates speak of the Royal Air Force they mean only the regular Force, whereas when mention is made of the Metropolitan Air Force, that term includes the Auxiliary squadrons as well as the regulars. The two separate conditions need to be kept in mind. The goal for which the Government is working is for a Metropolitan Air Force of 124 squadrons equipped with 1,750 first-line aircraft. The citizen must still further beware of another pitfall. He may think that all these are available for air defence, but if he does he will be wrong. The Metropolitan Air Force includes army co-operation squadrons which must accompany the Army wherever it may go, and also flying boat squadrons, whose particular function in a great war will probably be determined by circumstances. Both these must be deducted from the Metropolitan Air Force before the actual strength available for home defence becomes manifest.

One of the most interesting chapters in the Estimates is that which deals with Vote 4—namely, for Works, Buildings, and Lands. Space forbids publication of details, but it may be said that they give a real insight into the details of expansion, overseas as well as in this country. The gross estimate under this vote comes to the large total of eighteen and a half millions, as against less than nine and a half millions last year. Of this, fourteen millions will be raised by borrowing, and half a million from sales and rents, leaving only four million to be paid for out of taxes this year.

Considerable reticence is maintained in the Air Estimates concerning the expected expenditure on aeroplanes, engines, and spares. The only information vouchsafed is that a sum of £19,550,000 is to be provided for airframes and spares, and £9,450,000 for

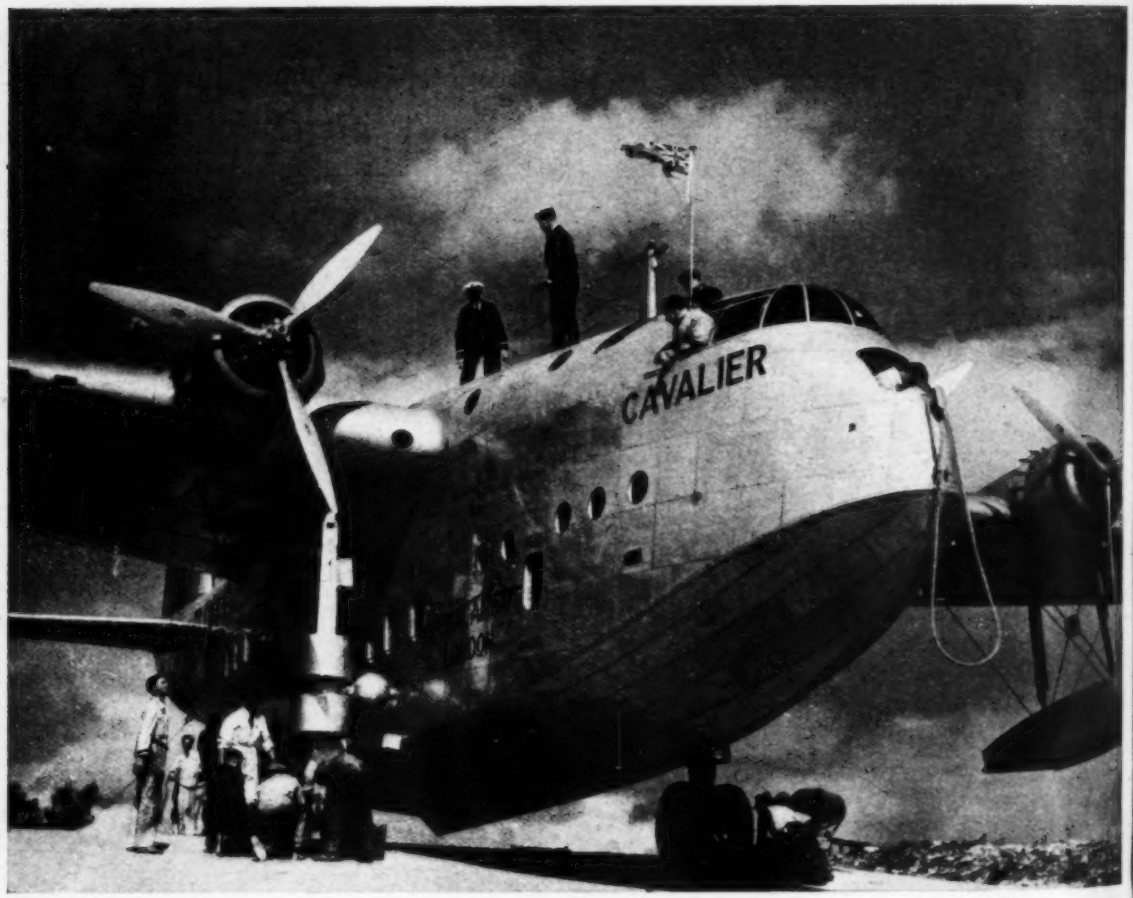
engines and spares, making a total of £29,000,000 for this particular subhead of Vote 3, and it is explained that it covers provision for the purchase of complete airframes and engines, including the cost of manufacture by the shadow factory organisation, for their reconditioning and repair, for spare parts and parachutes, and for research and development work carried out by contractors.

The material of the Fleet Air Arm is regarded for accounting purposes as the property of the Air Ministry, and the Admiralty makes a grant in respect of the Fleet Air Arm. This grant, under Vote 3, amounts for 1937 to £3,882,000, and includes the cost of increasing the number of fleet aircraft from 217 to 278. The corresponding grant last year was £3,275,000.

Experimental and Research Establishments show an increase of £98,500, which seems little enough in view of the many problems with which the re-equipment of the R.A.F. is accompanied. Apart from aircraft and engines, by far the greatest increase in any one item is that for armament and ammunition, for which close upon 7½ million sterling is set aside. This represents almost exactly double the amount under this subhead in last year's Air Estimates.

Obviously, a very necessary increase, if the new squadrons formed are not to spend most of their time on the ground, is that for petrol and oil. This subhead is estimated to require £2,760,000, compared with £1,580,000 in 1936. It is stated in the Memorandum that this includes provision for establishing reserves of these two essential fuels, a step which has often been urged upon the Government. Although one has no means of knowing what the Air Ministry pays for its petrol, it is obvious from the sum quoted that very large quantities have to be brought to this country during the year, and a few moments of reflection suffice to bring home the problems likely to be involved when the far greater quantity needed in an emergency is contemplated.

Already the much-discussed balloon barrage scheme is beginning to cast its shadow before it, the shadow taking the form of a sum of £690,000 under subhead J of Vote 3. An explanatory note states that this figure includes provision for the hydrogen cylinders and generating plants. Compared with the cost of the barrage scheme, it is somewhat disquieting to find that apparently the Air Ministry takes no great interest in airships, for which a ridiculous sum of £12,500 is set aside. No one would expect the Government to launch out again in the development of rigid airships, but there are those who believe that the small non-rigid may have some useful functions in case of war. Obviously, this view is not held at Adastral House.



SUNSHINE SOMEWHERE: A heart-warming picture, in these chilly British March days, of the Short Empire Boat *Cavalier* at the Bermuda Air Base for her experimental Bermuda to New York flights. Leaning from the cockpit is Capt. Armstrong, the commander, and in uniform is First Officer Richardson (second pilot); in mufti on top of the machine is Mr Bell, of Short Bros., and Mr. Hayden, of the A.I.D., is behind the flag mast.

The Outlook

A Running Commentary on Air Topics

Tomfoolery

LAST Saturday *The Daily Telegraph* published a message from its Washington correspondent which will be welcomed by all who take aviation seriously. It stated that there is a growing feeling in America that the proposed New York-Paris contest scheduled for August should be changed into an overland race. "Doc" Kimball, upon whose advice all successful Atlantic flights have been made, estimates that to provide sufficient information about weather conditions all the way across, to make the flight reasonably safe, would cost more than the total prize-money.

The French have a reputation for logic. In this particular instance the logic is difficult to find. The French Air Minister, M. Pierre Cot, sponsored the scheme; an excuse had to be found. Let us see, what happened ten years ago? Oh, yes, Charles Lindbergh was the first to fly solo across the Atlantic from New York to Paris. Very well, we'll have a race across, repeating his feat, on the days he made his flight, i.e., May 20-21. But then somebody remembered that possibly the racers might not have a fine day for their outing, so the date was changed to August and the period to any time during that month. So, instead of it being a race, it becomes a speed trial, the result of which cannot be known until the last competitor has got across or fallen in; and the date does not commemorate anything in particular.

It is difficult not to believe that the real reason for planning this singularly silly affair was not that France felt she was in danger of being left out of the picture so far as the North Atlantic was concerned, with America and Great Britain forging ahead with their plans for experimental services and Germany having made successful ship-based catapult-launched experimental flights. France must be in the picture at all costs, and, *voila!* the New York-Paris "race" was planned, Pierre financing not only the prizes but also several French competitors.

There is a very excellent chance of more than one crew being lost, and the contest will prove nothing; so if France *must* spend money on a race, why not make Indo-China or Madagascar the objective?

Cost of Civil Flying

WHEN considering the vote for Civil Aviation in the Air Estimates, it is best to look at the gross estimate rather than the net figure, for the most interesting side of civil flying is the Empire scheme, and that has to be paid for by the citizens of the Empire. The gross estimate this year is £2,499,000, of which the taxpayers of the Dominions and Colonies served will find £141,000. This sum of two and a half million pounds is a big jump from the modest £908,000 of last year. At least we have every expectation of getting good value for our two and a half millions, for the year is to see the gradual inauguration of the Empire air mail scheme as well as of the internal air scheme recommended by the Maybury Committee, to say nothing of the experimental long-range flights of *Cambria* and *Caledonia*, as well as of the Mayo composite, and the data to be accumulated by *Cavalier* on its trips to and fro between Bermuda and New York. Indeed, it is to be wondered if any other nation could budget to get such work done for so modest an outlay.

The Air Estimates say nothing about the threat to Gravesend Airport, but seem to regard it as an essential part of London's airport equipment, for provision is made to continue payments to the owners of Gravesend and Gatwick "in order to secure that relief aerodromes to Croydon shall be available when required." Heston, however, is to be bought by the Air Ministry, provided that the House of Commons passes this section of the vote, for it is stated in the Memorandum that "this aerodrome to-day provides essential facilities both for internal and for international purposes." Additional land is also to be bought so as to enlarge the aerodrome. The speculative builder must loathe the Air Ministry, but the community at large has good reason to thank it for coming to the rescue in such emergencies.

Overseas

BRITISH AIRWAYS, of course, continue to get their subsidy for the route London-Amsterdam-Hamburg-Copenhagen-Malmö and for direct services by day and night to Stockholm in conjunction with the Swedish company. Whenever one thinks of this line one feels a satisfaction that the monopoly of European subsidised services once conferred on Imperial Airways has not proved onerously monopolistic. The history of that arrangement encourages us as a nation to pursue the course of averting dangerous competition by granting monopolies without fear of them becoming dangerous in the long run.

The Memorandum speaks openly of the plans now under discussion for extending the Empire service from Sydney on to New Zealand. This could not be considered in a concrete manner until Australia had agreed to the flying boat route from Darwin following the coast down to Sydney instead of cutting across the mainland to Brisbane. The recently published life of Sir Charles Kingsford-Smith tells a dramatic story of how unpleasant it can be to fly across the Tasman Sea when things go wrong; but the old *Southern Cross* with one of its three Whirlwind engines out of action was a very different proposition from an Empire class boat with four Pegasus engines. But perhaps by the time the Tasman service is introduced, it will not be negotiated by the present Empire class, but by the future Atlantic class which is to be designed after digesting the experience which *Cambria* and *Caledonia* are now busily acquiring. After all, the Tasman Sea crossing is only a few hundred miles shorter than the route over the Atlantic between Ireland and Newfoundland.

All Home Comforts

SOUNDPROOFING, controllable cabin heating, and specially studied ventilation schemes are no longer perquisites of the flying hotel and capitalist commuting ship, but feature in increasing prominence in military specifications.

A certain degree of comfort makes for efficiency in any undertaking, be it bomb sighting or crocheting; some of our very best sniping in the last war was done from an armchair.

Who can make the best of a job if airscrews, blowers, intakes, and exhausts howl unremittingly through thin metal sheeting while his limbs are numbed with cold and his senses with carbon monoxide?

Will the names of Rumbold, Soundproofing, Ltd., and Moseley find a place with those of Browning, Oerlikon, Frazer-Nash, Armstrong Whitworth, and Wimperis?

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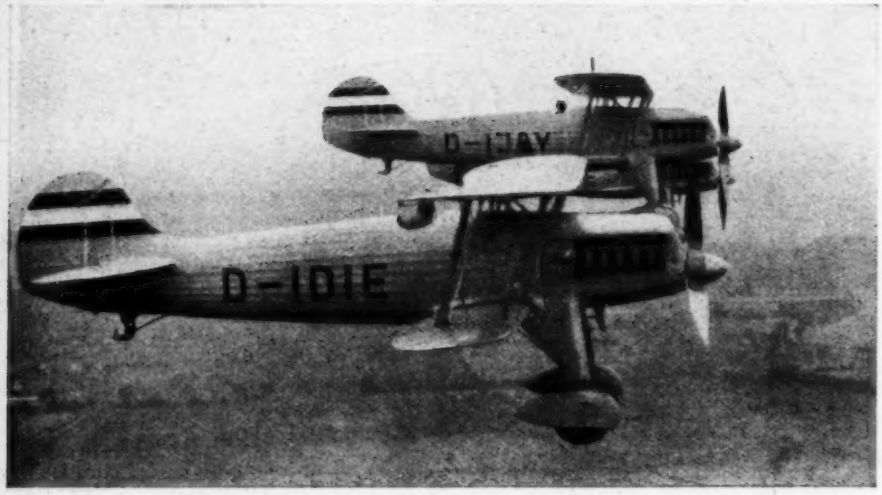


IN SEARCH OF GERMAN AND ITALIAN AVIATION —PART V

Two striking impressions, from the German official publication *Die Deutsche Luftwaffe* of Heinkel He.51s. in formation. This is the type with which the Richthofen Squadron is equipped.

THE RICHTHOFEN SQUADRON VISITED

How the German Air Force of To-day Works, Plays and Rests

By CAPTAIN NORMAN MACMILLAN, M.C., A.F.C., A.F.R.Ae.S., F.R.S.A.

TWENTY years ago I used to meet the Richthofen Squadron above the battlefields of Flanders. How well I remember the vivid colourings of their camouflaged Albatros D.V. fighters, with their round, streamlined fuselages, V-struts between biplane wings, and big, vertical water-cooled cylinders protruding above their tapered noses! Sometimes there were Fokker triplanes, too—blunt-nosed, square-tipped, ugly insects of the war.

We knew they were a good crowd, those fellows of the Richthofen Squadron. In our Mess—a marquee pitched at one corner of a tree-bordered meadow near Cassel—we used to speculate about them after dinner, weaving stories round them in our efforts to visualise them as men.

Sometimes, in a dog-fight, we flew so close together that we could see each other's features for a fleeting second, recognising an expression that, perhaps, mirrored our own: tense, alert, concentrated. Sometimes we knew (or thought we knew) individual machines—Richthofen's, his brother Lothar's, that of Voss or Schaefer. But mostly we felt that we fought "just machines."

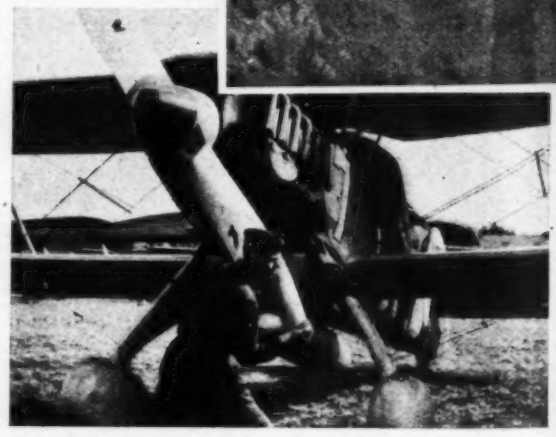
When one of our own aircraft went down, spinning, falling in zigzag curves, or leaving a growing spume of smoke behind a red and brightening flame, we thought of the man we knew. He was a comrade of days, weeks or (more rarely) months, but his loss was personal.

When the same fate befell an opponent we did not know the man. To us it was an aeroplane that went down—an Albatros, a Fokker—with the personal factor missing.

On both sides of that long, ambiguous line that was the air battle screen of the armies of the Western Front it was the same. To all British and German pilots, the things we shot down were Camels, Albatroses, Nieuports, Fokkers—not men. Perhaps that is why there is a feeling of camaraderie among the surviving pilots of the Great War, irrespective of their nationality. We did not think of killing one another. We wanted but to down machines and not be downed ourselves.

* * *

Now, twenty years later (and perhaps alone among the pilots who flew wing-tip to wing-tip with me in 45 Squadron), I have seen the Richthofen Squadron at home, lunched with them in their Mess.



In this view of one of the Richthofen Squadron's Heinkels, the bomb-like auxiliary fuel tank between the undercarriage legs is just discernible.

The tidiness of everything I saw, the keen discipline, the eager alertness of pilots and mechanics, mirrored the *esprit de corps* that must have existed during the height of the battle fame of the squadron. And I found that the spirit whereby British and German war pilots measured flying ability by a mutual standard of skill and courage in the air (which they willingly conceded each to the other) still lives.

Im Krieg geboren, im Krieg gestorben. So ran the motto for German pilots who survived the Great War: the christening, the epitaph of the German Flying Corps —*Born in the war and died in the war.*

It is still dead for, like our own Royal Flying Corps, it was a branch of the Army. But from its ashes has arisen the new *Luftwaffe* (literally Air Weapon) created by General-Oberst Hermann Göring and to-day a force in the Third Reich.

(Right) A fine example of modern German interior decoration — the ante-room to the Officers' Mess at Damm Aerodrome.

* * *

The officer who accompanied me from the German Air Ministry explained the composition of the new German Air Force as we drove along the long straight road from Berlin in one of the Air Force Mercedes cars. He spoke excellent English, learned (or perfected) in a prisoners' camp in England after he was brought down while raiding Boulogne.

"Strictly speaking," he said, "Geschwader translates into English as Squadron. But its military value in Germany is much greater.

"It is really our Staffel that corresponds to your Squadron. In a Staffel we usually have nine machines and generally three more on the station reserve.

"Then three Staffeln make one Gruppe. And three Gruppen make one Geschwader.

"So a Geschwader is actually a regiment of nine Staffeln, the equivalent of nine British squadrons. The Richthofen Squadron of to-day is a regiment of our Air Force. And to-day we are going to see the IInd Gruppe of the Richthofen Geschwader."

Some forty miles south of Berlin my guide pointed to the right. "Over there is an Air Force technical training school." A few minutes later he pointed again to the right. "Over there is a bombing practice school." A big aeroplane thrummed its way over distant woods. But in each case, apart from the aeroplane, I saw only fields and fir trees.

For leisure hours — the "winter garden" attached to the Officers' Mess.

In the German Air Force, my companion told me, there is no short-service commission. When an officer joins the Air Force it is for a life career. The training period lasts about two years. First, there are three months of disciplinary training—marching and drill; next, five months of study, followed by nine months of flying training. Then, if the flying is satisfactory, more study, and finally the examinations. If the pupil on probation is successful he gains his commission and becomes an officer for life.

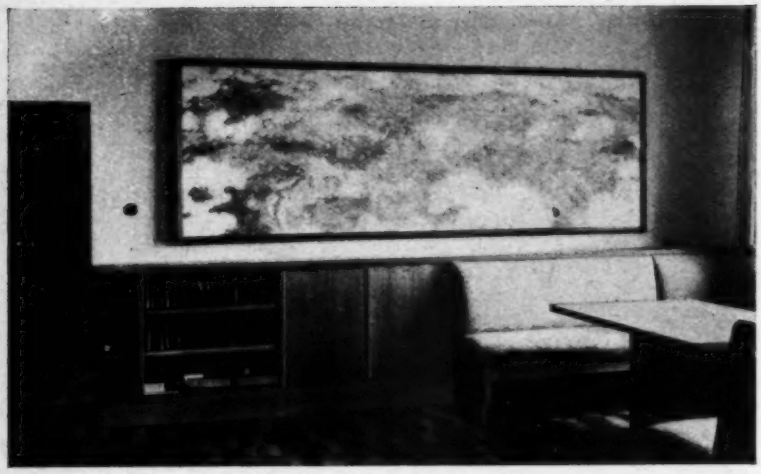
* * *

We skirted the town and bore to the right towards Damm aerodrome. All the buildings were new; two additional barracks were nearing completion. The concreted approach roads were excellent. We pulled up in front of the station headquarters that faced the flying field.

My companion entered the building and presently came back for me. We mounted the stairs, and a moment later I was introduced to Major Meyer, officer commanding the IInd Gruppe, Richthofen Squadron. During the Great War he was an infantry officer. Now he is a pilot.

The German Air Force ranks do not correspond to ours. They are approximately one rank lower for a given command, thus:

Royal Air Force	Rank of Commanding Officer.
Squadron	Squadron Leader, equal to Major.
Wing	Wing Commander, equal to Lieut. Colonel.
Group	Group Captain, equal to Colonel.
German Air Force.	**Rank of Commanding Officer.**
Staffel	Hauptmann, equal to Captain
Gruppe	Major, equal to Major.
Geschwader	Oberst (Colonel), equal to Lieut. Colonel.



Another corner of the ante-room to the Officers' Mess. The framed painting is an aerial view of the country surrounding the aerodrome.

It should, in passing, be noted that our Wing and Group are not in reality the same thing as the German Gruppe and Geschwader. While the British Wing and Group are really administrative, the German Gruppe and Geschwader are tactical units.

* * *

After a few minutes' talk, we passed through the Adjutant's office, then upstairs to the roof of the building whence we could survey the aerodrome. Four large hangars and one small hangar are spaced in a small segment of a big circle, with the H.Q. offices between, and with more space between the buildings than is usual on an R.A.F. aerodrome. Major Meyer pointed out that it was an unnecessarily large aerodrome for a fighter group. I agreed, but suggested that that was a good fault. It certainly allowed for expansion, or for the employment of the aerodrome as a bomber station, if necessary.

Hangar Design

Germany does not yet appear to have settled upon a standard type of bomb-proof hangar. In design, the hangars at Damm varied slightly, but in general they had curved concrete roofs, and steel doors that swung apart to allow almost the full width of the hangar front for the exit and entry of aircraft. The roofs are probably proof against at least small bombs, and are certainly splinter-proof.

The grouping of the buildings is designed to minimise damage from air attack. The hangars are not in line but in a curve. The barracks, too, are detached blocks of buildings with ample open spaces between.

* * *

We went down to the aerodrome and walked along to one of the hangars. There I was introduced to some of the pilots—fellows about 18 to 22 years old—mostly, but not all, fair-haired and blue-eyed.

At the invitation of Major Meyer I climbed into one of their He.51 Heinkels. It was powered with a 750 h.p. water-cooled B.M.W. engine. Its cockpit lay-out was neat and serviceable, with ample leg and elbow room. Twin machine-guns lay just below the cowling in front of the pilot. A neat, folding reflector glass sight lay in front of the windscreen, with a complementary ring sight. Fitted with wireless, oxygen equipment and neat bomb release gear, these machines were thoroughly up to date in equipment.

They had very small petrol tanks (210 litres), but carried a torpedo-shaped auxiliary tank (that could be dropped if necessary) mounted below the fuselage. The pilots were equipped with Irvin parachutes.

There is no doubt that those responsible for the equipment of the German Air Force have made a careful study of developments in other countries, for in these Heinkels—one of their earliest fighters—there was nothing missing, nothing left to chance.

In appearance they reminded one of the old 1917 Albatros D.V of the war, cleaned up, modernised, infinitely more powerful and faster. There was a distinctive family resemblance: they were children of the same brood, biplanes both.

The trend of the world to-day is to the monoplane. All the new British fighters are monoplanes, but have any of them yet reached squadrons? Doubtless the position is the same in Germany. Before long, I venture to forecast, the Richthofen Geschwader will be mounted on monoplane fighters.

* * *

We walked to the next hangar. One Staffel of the Gruppe had flown off that morning for firing practice. One of its machines landed as we walked across the aerodrome. The pilot climbed down and, standing rigidly to attention, told Major Meyer he had had to return with an overheating engine.

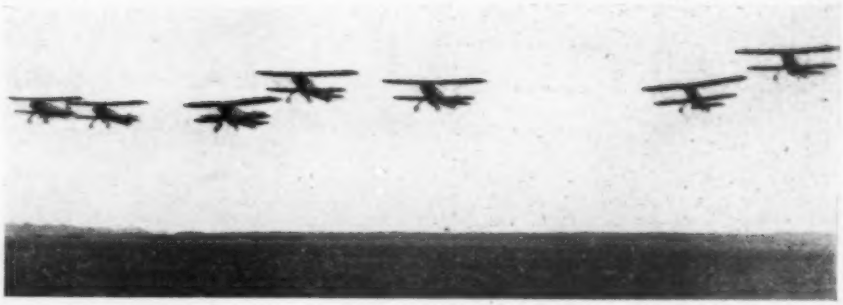
Maintenance Methods

After the C.O. had heard the pilot's explanation we entered the hangar. It contained an assortment of different types of aircraft. Among them were light trainers, one or two fighters, some heavier reconnaissance machines. Many had the cowling removed for engine inspection; others were undergoing inspection of flying controls and other details.

The third hangar contained aircraft undergoing more extensive overhaul. A fully equipped workshop on one side contained a number of small machine tools and wood-working machinery to deal with minor repairs.

I learned that German military air stations repair minor damage to their aircraft in their own workshops. At Damm, repairs were handled by civilian workmen. I should imagine that up to approximately 30 per cent.

The Heinkel He.51 "... reminded one of the old 1917 Albatros D.V. of the war, cleaned up, modernised, infinitely more powerful and faster." The civilian markings of German military aircraft are in some cases being discontinued.



A Staffel of the Second Group, Richthofen Squadron, taking-off from Damm Aerodrome. The view shows the open nature of the country.

damage is dealt with at air stations; damage in excess of that percentage requires the aircraft to be sent to a major repair depot. They are not returned to the production factories. Our own Air Ministry should make arrangements for repairs not to interfere with the work of production factories. Such work, as was suggested in Parliament the other day, might be carried out by existing non-contracting firms.

The fourth hangar, which was closed, we did not enter.

At the fourth hangar we entered Major Meyer's car and drove round the aerodrome. The surface was excellent. A shooting range stood amid trees in a hollow on one side of the aerodrome, with targets placed against large artificial mounds of earth. There were two ranges, one of 100 metres and the other of 200 metres. The shorter range was suitable for the sighting of machine guns. The longer range was rather great for the alignment of aircraft machine guns, but suitable for the sighting of light ground machine guns, or the testing of aircraft *canons*.

Save for the hangars and administrative building and an experimental Lorenz D.F. equipment, there were no obstructions to the flying approach to the aerodrome. All fuel tanks lay underground.

Life of the Personnel

I was asked if I would like to look at the barracks. Externally, they reminded me of modern British council houses. Each block had ample sanitary and washing accommodation, with showers instead of baths, an eminently hygienic method of bathing. The troops were apportioned five to a room of ample size for the number. There were two double cots with beds one above the other and one single cot, and chairs, table and metal lockers for the personal belongings of the occupants. The quarters were comfortable and well lighted and heated.

It was obvious that discipline was strict, but easy to see that there existed between the troops and the Commanding Officer a genuine regard for authority on the one hand, and on the other a sympathetic concern for the welfare of the men.

We went to the canteen, where the troops can purchase special requirements of their own, and from there passed into the common hall where the men had already begun midday dinner. On our entry they were called to attention, and stood up, but Major Meyer immediately gave the order to sit down and continue their meal. They looked a healthy, happy crowd as we passed down the lines of tables and benches to the kitchens. The kitchens, staffed by women cooks and assistants, were beautifully clean. Large semi-spherical metal vessels were used for cooking. They could be tipped forward on gimbals to facilitate service. The vessels appeared to be made of monel metal, and were heated by steam from a separate boiler house.

I looked into one of the blocks of buildings for the accommodation of officers. Toilet and bath accommodation, complete with baths and showers, was provided for every unit of four rooms. Externally, the buildings looked very little different from those provided for the troops. Internally, the main difference appeared in the furnishings of the individual rooms, which, of course, were provided by the Government. Furniture and fittings were of good quality, simple yet attractive. The quarters were certainly comfortable and the equal of anything we have in the Royal Air Force.

* * *

Some of the younger officers had already assembled in the ante-room. I was introduced to those I had not met in the hangars.

All the officers wore trousers similar to those of the Royal Air Force. With breeches, typical German field boots are worn. Recently, however, Colonel Udet, the famous war pilot, had to jump by parachute. He reported that had he been wearing field boots he might have been unable to get away. Now, the Air Ministry is considering the abolition of field boots for the Air Force and the substitution of a kind of ski-ing trouser for flying duties.

The German Air Force uniform is a smart blue, with white piping, and the distinctive Air Force badge worn on the right breast. The pilot's flying brevet is a separate metal badge worn lower down, on the left side of the tunic. Blue soft shirts and black ties are worn with the open-neck tunic.

Different coloured badges on the upper lapels of the tunic distinguish the various categories in the Air Force. Most of the officers around me wore the gold badges which denote the flying officers. The officer from the Air Ministry wore black badges. Other badges are white, crimson, brown, green, dark and light blue, thereby distinguishing at a glance Generals, Anti-Aircraft, Engineers, Signals, Observer Corps, Medical and Air Force Reserve.

All air defence and offence is grouped within the German Air Force under the Air Ministry. This is contrary to the British system, where, of course, the major part of the ground defences, composed of searchlights and anti-aircraft guns, are the responsibility of the War Office and operated by the Army and the Territorial Army. Personally, I believe the German system to be the correct and more efficient organisation.

National Heroes

On the wall of the Mess were photographs of Hindenburg, Hitler and Göring, and the two famous leaders of the Richthofen Squadron who died in battle—Boelcke and Richthofen.

After lunch I was shown over the remainder of the Mess. There was a small billiards room equipped with a small German billiards table, without pockets. Beyond was a little winter garden, facing south, with numerous examples of cactus on the shelves about the windows. On the floor below was a Bavarian bar, with the verses of quaint Bavarian songs painted on the walls; but no translation can reproduce their original meaning in the Bavarian dialect. Before I left the aerodrome of Damm I had to sign the visitors' book. Just above my signature were those of two R.A.F. officers.

Our party was photographed on the steps of the Mess just before the officer from the Air Ministry and I re-entered the Mercedes to return to Berlin. I drove away from Damm with the feeling that, if I had visited the Richthofen Squadron in France during the Great War, though I would have seen a change to the conditions one found in the Field, I would have encountered no greater *esprit de corps*.

This Squadron, that ceased to exist for fifteen years, has been reborn, and with its rebirth has come a fresh enthusiasm determined to uphold the magnificent tradition of its famous forerunner in the field in France and Flanders.

(The next article in this series will deal with Guidonia—Italy's National Air Laboratory.)

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

IT is reported that plans are being made for a "black-out" of all Switzerland. The co-operation of the League of Nations has been sought.

About £400,000 is to be spent on Birmingham's first air-raid precautions scheme, which will require the services of between 2,000 and 3,000 volunteers.

Mlle. Maryse Bastié, who flew from Dakar to Brazil in December, was presented with the insignia of an Officer of the Legion of Honour by M. Cot, the French Air Minister, last week.

The Royal Aero Club has drawn up a complete list of aviation fixtures for 1937. Lists will be issued free of charge to anyone applying to the Royal Aero Club, 119, Piccadilly, London, W.1.

This evening, March 11, Major B. C. Carter, A.R.C.Sc., D.I.C., F.R.Ae.S., M.I.Mech.E., will read a paper before the Royal Aeronautical Society on "Airscrew Blade Vibration."

The lecture will be given at 6.30 p.m. in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, London. Non-members will be admitted only by a ticket obtained through a member.

Twenty-five Years Ago

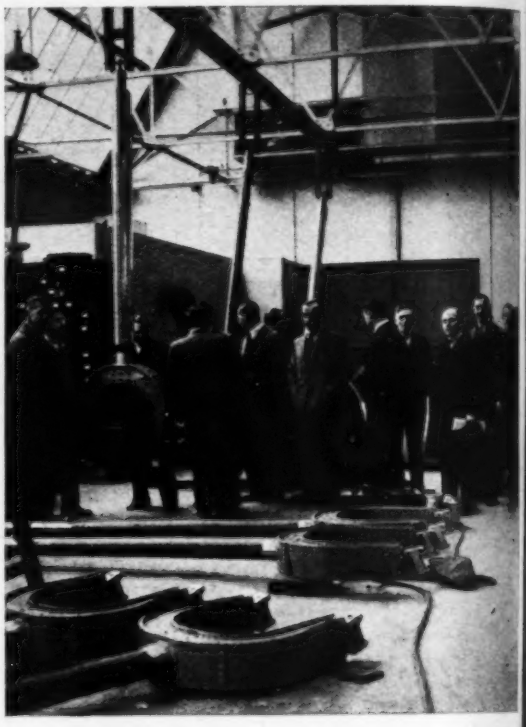
(From "Flight" of March 9, 1912.)

"In the House of Commons . . . in reply to a question . . . as to whether the Government had made any attempt to secure the prohibition of bomb-throwing airships or aeroplanes in time of war, Mr. Acland, Under-Secretary for Foreign Affairs, referred to the declaration signed at the last Peace Conference by the representatives of some twenty-seven States, including Great Britain, prohibiting the discharge of projectiles and explosives from balloons or by other new methods of a similar nature.

Lord Furness's Lockheed 12 was brought to Heston last week by his personal pilot, Mr. Dan Cameron. Pratt and Whitney Wasp Juniors, driving Hamilton constant-speed airscrews, are fitted.

Lord Swinton, the Air Minister, is to take a month's rest at his country home, Swinton, Masham, Yorkshire, on the advice of his doctor. Sir Thomas Inskip will temporarily supervise the work of the Air Ministry.

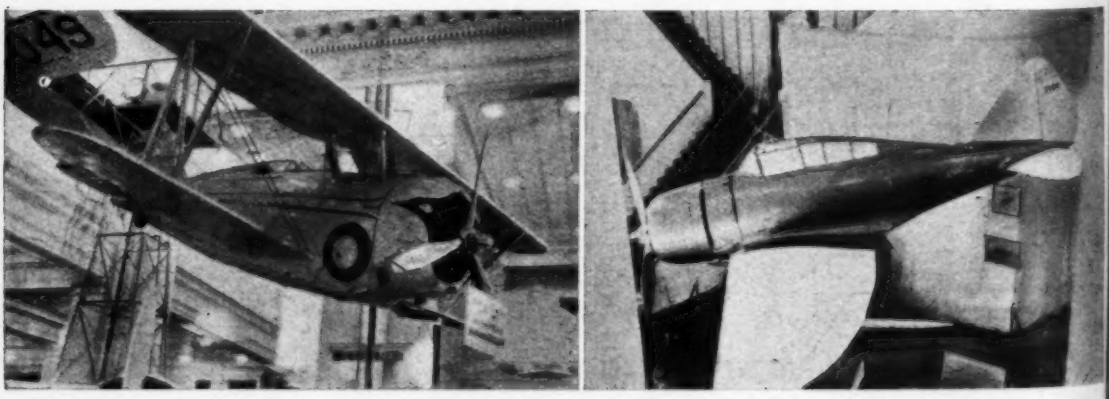
It seems that there is considerable opposition in the United States to the New York-Paris race which is to be sponsored by the French Government to commemorate the tenth anniversary of Col. Lindbergh's flight. It has been suggested that the course should be set overland as an alternative. Comment on this development appears on p. 225.



LEG SHOW: Members of the R.A.F. Staff College, Andover, in the undercarriage-erection department of Handley Page's Cricklewood works, where they inspected the methods used for the rapid production of large numbers of Harrow heavy bombers. (*Flight* photograph.)

Mr. J. R. Ashwell Cooke, who has done so much to popularise gliding, was married at Bexhill last week to Miss Georgina Murphy. After the ceremony Mr. Cooke and his bride left Croydon by air for Monte Carlo.

Seversky is offering a two-seater Cyclone-powered fighter with a maximum speed of 312 m.p.h. and a range of 2,100 miles at 70 per cent. horsepower. With extra tankage the range can be increased to about 5,000 miles.



NATIONAL SHOW: Contrasts in fighters at the National Aviation Show recently held in New York. On the left is Major Al Williams' Grumman Gulfhawk (1,000 h.p. nine-cylinder Wright Cyclone), and on the right the Seversky pursuit (1,000 h.p. Pratt and Whitney Twin Wasp) ordered in quantity by the U.S. Army Air Corps.

A NEW TWO-STROKE

Cooling, Lubrication and Distribution Reported Satisfactory: Inverted Version to Follow.

MANY have been the attempts to adapt the simplicity of the plain three-port two-stroke engine to the special needs of aviation. Few, if any, have succeeded. Recently, however, a designer whose name is well known has completed some fifty hours test-bench running of a simple, straightforward four-cylinder-in-line two-stroke in which, it seems, the usual troubles have been avoided. Even at full throttle, it is claimed, the engine keeps cool; there is no popping in the single carburettor; the engine idles smoothly and without four-stroking at speeds as low as 500 r.p.m.; and no trouble with plugs has been experienced.

For certain reasons the designer does not wish to disclose his name at the moment, and thus it becomes necessary to refer to the engine as the "B" type. This has four air-cooled cylinders in line, each of 500 c.c. capacity. The cylinders are single alloy castings with austenitic cast-iron liners shrunk into them. The pistons are of "Y" alloy, and by their freedom from scoring and gumminess of the rings seem to indicate cool running. This is doubtless due to the adequate cooling area (600 sq. in. per cylinder) and to the symmetrical shape of the cylinder heads.

Some Details

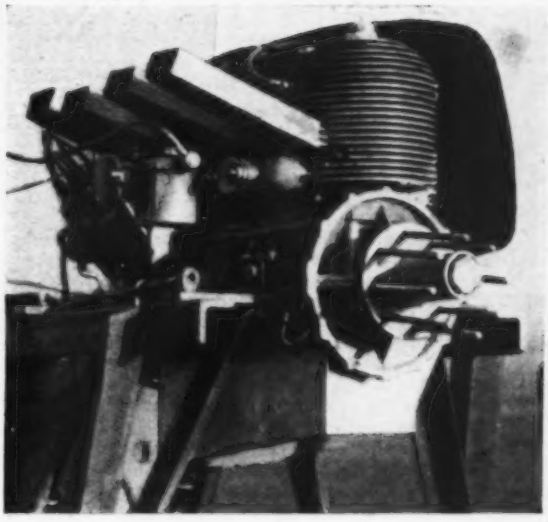
The crankshaft is of the solid type, the big ends of the connecting rods being of the split type with needle bearings, while the crankshaft itself runs in split white-metal-lined bearings, pressure lubricated.

The single carburettor gives smooth running and a fuel consumption of 0.6 lb. per b.h.p. hr. The oil consumption is about 1 pint per hour. At 3,000 r.p.m. the engine develops 50 b.h.p.

Two four-pole B.T.H. magnetos, the oil pump, the fuel pump operating cams, and the tachometer drive are driven from the tail end of the crankshaft through skew gearing.

As a result of the test bench running of the "B" engine a larger model, to be known as the "C," has now been designed and incorporates certain improvements. For example, it is of the inverted type, thus giving a better view in single-engined installations. A large percentage of the components can be used in building three-cylinder and six-cylinder models of 40 and 90 b.h.p. respectively, while the addition of airscrew reduction gears would enable the engines to be run up to 4,000 r.p.m. and develop correspondingly greater power. It is estimated that these engines could, owing to their extreme simplicity, be built to sell at an average price of 25s. per h.p. The weight will be in the neighbourhood of 2 lb. per h.p.

W. S. Shackleton, Ltd., of 175, Piccadilly, are acting as representatives for the designer, and enquiries should be addressed to them.



The "B" type engine in an outdoor test bed

A Percival Appointment

IT is announced that Mr. M. S. Barrington, late of the De Havilland Company, has joined the sales organisation of Percival Aircraft, Ltd.

"Bostik"

IN order to make their title more descriptive of their increasing activities, the Boston Blacking Co., Ltd., of Leicester, will henceforth be known as the B.B. Chemical Co., Ltd. One of their specialities is "Bostik" adhesive for aircraft windows and windscreen sealing.

1936 Flights

THE Castrol 1936 Book of Achievements is of particular interest to flying people, reviewing as it does the many record flights of last year, beginning with the England-Capetown record lowered by Flt. Lt. Tommy Rose and continuing with the various achievements of Mrs. Amy Mollison, Mr. H. L. Brook, Miss Jean Batten and others. The booklet may be obtained free, and post free, from C. C. Wakefield and Co., Ltd., Wakefield House, Cheapside, London, E.C.2.

V.P. Airscrew Servicing

ALL sizes of American-made Hamilton v.p. airscrews and the several British models can now be fully serviced at the Edgware Airscrew Division of the De Havilland Aircraft Co., Ltd. This new facility is significant in view of the extensive European orders which have recently been placed for De Havilland v.p. airscrews for use with British engines.

The "5,000 size" three-bladed airscrew for engines of about 1,000 h.p., American models of which, it is stated, have now run for over 4,000 hours without any replacements, is at present the largest model made in this country, but it is hoped that a bigger model, suitable for 1,500 h.p. or more, will shortly be available.

Creditable performance figures have recently been obtained on the Short Empire Boats using "5,000 size" airscrews—some 40 of the 150 ordered have now been delivered. *Caledonia* and *Cambria*, the long-range boats, took off in 30 seconds with an all-up weight of 45,000 lb. (about 2 tons more than normal).

Vickers Aircraft Reorganisation

FOLLOWING upon the decision of the Board of Vickers, Ltd., to transfer to Vickers-Armstrongs, Ltd., the operation of the aviation companies—Vickers (Aviation), Ltd., and the Supermarine Aviation Works (Vickers), Ltd.—Comdr. Sir Charles Craven, R.N., chairman of Vickers-Armstrongs, Ltd., becomes chairman, and Sir Robert McLean managing director, of the two aviation companies. Sir Robert McLean is appointed to the board of Vickers-Armstrongs, Ltd.

LIGHT AIRCRAFT and THEIR EQUIPMENT

NEXT week's issue of FLIGHT will be a Special Number with the above title.

It will contain a number of articles of interest to the "private" pilot and to those about to take up flying, including a contribution, by a well-known pilot, on air racing for the amateur, and another, by an equally well-known private owner, on air touring. There will be a guide to the flying clubs of Britain and their tuition and hire fees. A fully illustrated review of modern club and private-owner aircraft, written from the practical pilot's viewpoint, will be a feature of this special issue.

Next Thursday FLIGHT ***March 18***

THE AIR ESTIMATES

£33,000,000 *More than Last Year's : Fleet Air Arm Grant Up by Nearly One Million :* £29,000,000 *for Aircraft and Engines*

AS was expected, the Air Estimates for 1937, issued last Friday, showed very considerable increases both in the number of personnel and in the sums to be voted for air defence. The gross totals are, perhaps, of most interest in that they show what the country is spending on air equipment. For 1937 the gross figure is £88,588,600 against a gross total of £55,705,600 in 1936. By the end of this year the personnel of the R.A.F. will total 70,000. Appropriations-in-aid and the grant for the Fleet Air Arm will reduce the amount to be borne by the Air Votes to £82,500,000.

As usual, the Air Estimates were accompanied by a Memorandum by the Secretary of State for Air, Lord Swinton. The first part of this Memorandum was devoted to a review of the various decisions of the Government on air defence, and showed the steps by which from time to time the successive expansion schemes resulted in the present position.

After mentioning certain delays in the delivery of air frames, the Memorandum continues:—

"A large measure of reliance had necessarily to be placed on the forecasts of the manufacturing firms, and these forecasts have proved in practice to have been too optimistic. Even so, in spite of the fact that the greatly increased capacity of the factories is only partly evidenced by the output up to date, actual deliveries of Service aircraft during the last 11 months amount to over 2½ times, and of engines over 3½ times the average annual pre-expansion output. The number of persons employed in the aircraft industry has increased to 63,000 and it must be borne in mind that this figure takes no account of the many thousands of persons employed in the production of armament and equipment or by firms engaged on ancillary work for the aircraft industry.

"Substantial progress has also been made in other directions. On April 1st, 1937, the Royal Air Force will comprise 100 squadrons stationed at home, the equivalent of 20 squadrons serving with the Fleet Air Arm, and 26 squadrons serving overseas. The strength of the Royal Air Force will have risen to 4,850 officers and 51,000 airmen. Flying training is now carried out at 13 civil flying schools, in addition to the Service Flying Training Schools, the number of which has been increased from four to eleven. Increases have also been made in the other training and maintenance establishments.

"On the industrial side, additions have been made at existing aircraft manufacturing firms, and in order to broaden the basis of production, certain firms have, with Air Ministry approval, entered into agreements with firms outside the industry, which will enable the resources of these latter to be used for the production of aircraft. In addition, a number of firms have agreed to erect and manage "shadow" factories for the Government. Six factories for the manufacture of engines are in course of erection, and most of these will be completed within a few months. One airframe factory is nearing completion, and work on the second has commenced. New factories are also being established for the manufacture of airscrews and certain types of bombs."

Other noteworthy points from the Estimates were as follows:—

Financial Summary

Air Estimates for 1937 amount to a total of £88,885,600 gross, after making due allowance for underspendings which experience has shewn to be necessary. The comparable total for 1936 was £55,705,600 including the additional sum granted by Supplementary Estimate in July last.

The net total is £56,500,000. Allowance has been made for a special appropriation-in-aid of £26,000,000 from the Consolidated Fund under the conditions explained in the Statement relating to Defence Expenditure (Cmd. 5374) and, but for this, the net total of the Votes for 1937 would have been £82,500,000. The corresponding net figure for 1936 was £50,700,000, so that the true net increase is £31,800,000.

The comparative figures for recent years are shewn in the following table.

	1934, including Supplementary Estimate.	1935, including Supplementary Estimates.	1936, including Supplementary Estimate.	1937.
	£	£	£	£
Gross Estimate	20,365,600	31,002,100	55,705,600	88,588,600
Deduct Fleet Air Arm grant	1,338,000	1,993,000	3,572,000	4,200,000
Deduct Other Appropriations-in-aid	1,266,000	1,413,100	1,433,600	1,888,600
Net Estimate, apart from Loan provision	17,761,000	27,596,000	50,700,600	82,500,000
			Deduct Loan provision	26,000,000
			Net Estimate to be voted, 1937...	£56,500,000

Strength and Organisation of the R.A.F.

The present scheme of expansion provides, *inter alia*, for a Metropolitan Air Force with a first-line strength of approximately 1,750 aircraft. These will be organised in 124 squadrons, of which 100 will have been formed by the end of March. During the summer the number will rise to 124 squadrons, including 20 squadrons of the Auxiliary Air Force, with an approximate first-line strength of 1,500 aircraft. These 124 squadrons will subsequently be increased in size to give the necessary total first-line strength of 1,750 aircraft.

It is also proposed to create ten special units of the Auxiliary Air Force for operating a balloon barrage in connection with the defence scheme for the London area. The work of organisation is proceeding; orders for the necessary balloons and equipment have been placed, and deliveries are already being received.

One of the additional squadrons for overseas was formed in 1936, bringing the overseas strength to 26 squadrons.

Provision is taken for increasing the Fleet Air Arm from 217 to 278 first-line aircraft during the course of the year, in conformity with Admiralty requirements for aircraft carriers and catapult ships.

Personnel and Training

Vote 1 (Pay, etc., of the Royal Air Force) stands at £8,466,000 net, an increase of £1,776,000 over the corresponding provision for 1936.

The programme for the entry over a two-year period of some 2,500 pilots and over 22,000 airmen, is now substantially complete. For the year 1937, entries of 1,500 pilots and some 15,000 airmen are required. The results which have so far attended the efforts to recruit personnel of high quality in these large numbers are a tribute to the air enthusiasm and patriotism of the younger generation, and the more difficult task of maintaining recruiting at a high level in numbers and in quality can be faced with reasonable expectation of success.

The training of pilots has proceeded with marked success, though this has only been possible by sustained efforts on the part of the 13 civil schools and the 11 Service schools on which the work has fallen. Both types of school have proved equal to the demands made upon them, which include not only more intensive flying instruction than in the past, but also more advanced training in instrument flying, night flying, navigation and training in air gunnery and bombing. The growing importance of navigational training has also been recognised in the creation of a new School of Air Navigation at Manston.

Auxiliary Air Force

Vote 7 (Auxiliary and Reserve Forces) stands at a net total of £1,360,000, which represents an increase of £709,000 over 1936.

Following the policy announced in 1936, four out of the five Special Reserve squadrons have been converted to Auxiliary Air Force squadrons, and the necessary steps for conversion of the remaining squadron are under consideration. Four additional Auxiliary Air Force squadrons are also being formed, and the Force will then consist of 20 squadrons. It is also to be noted that the balloon barrage organisation outlined earlier in this Memorandum will be established on an Auxiliary Air Force basis.

Reserves

To meet the large increase of reserve personnel now necessary a new organisation known as the Royal Air Force Volunteer Reserve is being created. This scheme provides for the entry of young men for training as pilots while continuing their civil occupations. It is hoped that not less than 800 will be entered in 1937. They will be required to give 15 days' continuous attendance for training annually, but the distinctive feature of the scheme is that the rest of the training will be carried out in the evenings and at week-ends.

Technical Equipment

Before deducting the sum of £12,000,000 provided by Loan, the net total of Vote 3 (Technical and Warlike Stores) is £43,542,000; the corresponding figure for 1936, including the amount taken in the Supplementary Estimate, was £26,546,000. The large increase is attributable in the main to payments maturing in the course of the year on long term contracts which have already been placed in respect of aircraft, equipment and other technical stores.

The increased expenditure falling on this Vote is indicated by the fact that the net provision for 1937 (before deduction of the Loan appropriation-in-aid) is more than six times the corresponding figure for 1934: a further increase will be required in 1938 to cover commitments under the programme now in process of execution.

After the initial requirements for new squadrons have been met, and squadrons equipped with older types of aircraft have been rearmed, deliveries of new types of aircraft will be applied to the accumulation of reserves to the requisite scale. The new types for the Metropolitan Force are of monoplane construction incorporating modern devices for giving high performance under service conditions. Engines of the latest design will be employed including the sleeve-valve type. Special attention has also been given to improving and simplifying aircraft equipment, including instruments, wireless apparatus and armament, with particular reference to standardisation for production purposes.

Provision is made in Vote 4 for the capital expenditure on the construction and equipment of the "shadow" factories to which reference is made above, but the current cost of manufacture of the airframes, engines, and other equipment produced falls on Vote 3. In this latter Vote also provision is made for reserves of equipment (including petrol and oil) as well as for the establishment of stocks of essential raw materials.

Research and Technical Development

Side by side with the rapid expansion in production, the aircraft industry has experienced a phase of rapid change in design and methods of construction. In consequence, provision has had to be made for an accelerated and extended programme of research and development on aircraft and engines to deal with the wide range of new problems which has arisen. Research into armament problems and into the development of new methods of air defence has also required increased study and expenditure. On all aspects of this extended research programme, the Air Ministry has had during the past year the advice and assistance both collectively and individually of a number of eminent scientists. The greatest importance is attached to this co-operation.

Apart from problems of immediate urgency in connection with air defence and those which arise from the present production programme, the needs of the future are being covered by an extended programme of research and development. This includes a number of aircraft and engines of new design to meet the latest operational requirements.

Works

Before deducting the sum of £14,000,000 to be provided for by Loan, the net total of Vote 4 (Works, Buildings and Lands) is £18,000,000. The increase of £8,650,000 over the total provision voted by Parliament for 1936 is due to the further progress expected on the programme of capital expenditure on lands and buildings, including the construction and equipment of "shadow" factories.

Extensions, either permanent or temporary in character, have been carried out at 34 of the 52 aerodrome sites which existed at home at the end of 1933. Thirteen additional aerodrome sites are now in occupation and, in addition, five civil aerodromes have been equipped and are being used for service purposes. Work is in progress on another 26 sites and further sites will be acquired during the course of the year.

As regards maintenance organisation, two of the nine sites without aerodromes which are needed have already been acquired, and negotiations for four more have commenced.

Negotiations are in progress also for sundry small areas of land required for ranges, headquarter and medical units, W/T stations, etc., Overseas, sites for seven new stations have been, or are in course of being, acquired, and three more have been selected.

In addition to the contracts for complete stations referred to above, contracts have been placed for the hangars required for another 16 stations.

In 1937, contracts will be placed for the construction of permanent accommodation at six new operational stations at home and six new operational stations overseas. Contracts will also be placed at home for one new Flying Training School,

ABSTRACT OF AIR ESTIMATES, 1937.

Votes.		ESTIMATES, 1937. Gross Estimate.	ESTIMATES, 1937. Appropriations-in-Aid.	ESTIMATES, 1937. Net Estimate.	ESTIMATES, 1936. Including Supplementary Estimate (a). Gross Estimate.	ESTIMATES, 1936. Including Supplementary Estimate (a). Appropriations-in-Aid.	ESTIMATES, 1936. Including Supplementary Estimate (a). Net Estimate.	DIFFERENCES ON NET ESTIMATES. Increase.	DIFFERENCES ON NET ESTIMATES. Decrease.
				Total Numbers.			Total Numbers.	Numbers.	Numbers.
A	I.—NUMBERS: Maximum Number of Officers, Cadets and Airmen to be borne on the Establishment of the Royal Air Force, exclusive of India ...	—	—	70,000	—	—	55,000	15,000	...
	II.—EFFECTIVE SERVICES:	£	£	£	£	£	£	£	£
1	Pay, etc., of the Royal Air Force	9,001,000	535,000	8,466,000	7,340,000	650,000	6,690,000	1,776,000	...
2	Quartering, Stores (except Technical), Supplies and Transportation	4,600,000	124,000	4,476,000	3,482,000	146,000	3,336,000	1,140,000	...
3	Technical and Warlike Stores (including Experimental and Research Services)	48,132,000	16,590,000	31,542,000	30,340,000	3,794,000	26,546,000	4,996,000	...
4	Works, Buildings and Lands	18,525,000	14,525,000	4,000,000	9,498,000	148,000	9,350,000	—	5,350,000
5	Medical Services	466,000	27,000	439,000	405,000	23,000	382,000	57,000	...
6	Technical Training and Educational Services ...	755,500	14,500	741,000	671,000	14,000	657,000	84,000	...
7	Auxiliary and Reserve Forces	1,360,100	100	1,360,000	651,100	100	651,000	709,000	...
8	Civil Aviation	2,499,000	184,000	2,315,000	908,000	148,000	760,000	1,555,000	...
9	Meteorological and Miscellaneous Effective Services	(b) 1,463,000	34,000	1,429,000	876,000	32,000	844,000	585,000	...
10	Air Ministry	1,264,500	14,500	1,250,000	1,050,000	10,000	1,040,000	210,000	...
	Total Effective Services	£88,066,100	£32,048,100	£56,018,000	£55,221,100	£4,965,100	£50,256,000	£11,112,000	£5,350,000
11	III.—NON-EFFECTIVE SERVICES: Half-Pay, Pensions and other Non-Effective Services	(b) 552,500	40,500	482,000	484,500	40,500	444,000	38,000	...
	Total Effective and Non-Effective Services	£88,588,600	*£32,088,600	*£56,500,000	£55,705,600	£5,005,600	£50,700,000 (a)	£11,150,000	£5,350,000

Net Increase £5,800,000

(a) Total, Original Net Estimate, 1936 ... ... £39,000,000
Add—Supplementary Estimate (H.C. 137 of 1935-36) 11,700,000
50,700,000

(b) Certain non-effective charges in respect of staff for Meteorological Services are provided for under Vote 9.

* The appropriations-in-aid include sums aggregating 26,000,000*l.* which, subject to statutory authority being obtained in accordance with the terms of the Defence Loans Bill now before Parliament, will be provided by issues from the Consolidated Fund (*see* Vote 3, subhead P, page 51, and Vote 4, subhead N, page 87). The net total of Air Estimates before deducting the sum to be received from this source is 82,500,000*l.*

two new Armament Training Camps, two new Equipment Depots, a new Aircraft Repair Depot, a new Hospital, and a number of storage units, including reserve storage for petrol and ammunition. Financial provision has been made for the works and lands services necessitated by the scheme for a Balloon Barrage and the Volunteer Reserve Training Scheme.

The new Royal Air Force station at Dhibban in Iraq is nearing completion, and a portion of the station has already been occupied by units transferred from Mosul. Provision has been made for the receipt of the sum which the Iraq Government has undertaken to pay for the cantonments at Hinaidi and Mosul, which are to be vacated by the Royal Air Force, in accordance with the terms of the Anglo-Iraq Treaty of 1930.

In view of the conclusion of the Treaty with Egypt, sites are being selected for the new R.A.F. stations which are to be constructed by the Egyptian Government in the Canal zone.

Civil Aviation

The net total of Vote 8 (Civil Aviation) stands at £2,315,000. This represents an increase of £1,555,000 over the corresponding figure for 1936. This large increase arises directly from the major developments of policy with which Parliament is already familiar—the inauguration of the Empire Air Mail scheme; the extended organisation of Empire air routes; experimental oversea flights, including flights across the North Atlantic Ocean; the purchase of Heston Airport; and the creation of the air traffic control organisation in the United Kingdom to carry out the recommendations of the committee under the chairmanship of Sir Henry Maybury.

According to the present programme, the complete Empire Air Mail scheme for the carriage of first-class mail on Empire air routes, for the most part without surcharge, will begin in 1938. In 1937, however, there will be an "introductory" period during which the scheme will be brought into operation gradually over the different routes, as aircraft and the necessary ground equipment become available.

It is hoped that the projected air service between Bermuda and New York, to be operated by Imperial Airways, Ltd., in co-operation with Pan-American Airways Incorporated, will be inaugurated in April next. Money provision has accordingly been made for the agreed annual subsidy of £18,000 payable to Imperial Airways, Ltd., for this service, and the Appropriations-in-aid subhead includes an amount of £3,000 on account of the annual contribution by the Government of Bermuda.

For their European services, the provision of £50,000 as subsidy payment to Imperial Airways, Ltd., represents a fall of £15,000 on the figure for 1936, under the terms of the agreement with the Company.

Following upon the preliminary service operated by British Airways, Ltd., over the route London-Amsterdam-Hamburg-Copenhagen-Malmö, an agreement was concluded with the Company, on July 16 last, for a regular daily service in each direction for passengers, mails and freight between London and Stockholm, and for a night mail service between these capitals via Cologne and Hanover under a "pooling" agreement between the Company and the Swedish air transport company, A.B. Aerotransport (*see* Cmd. 5203). So far as the night service is concerned, as a temporary arrangement British Airways, Ltd., are operating five nights a week (Monday-Friday) in each direction between London and Hanover, connecting with an existing night service operated by the Swedish Company between Stockholm and Hanover. A subsidy payment of £25,000 to British Airways, Ltd., under the terms of the agreement is allowed for these services.

A sum of approximately £700,000 has been included for the work of improving the ground facilities on Empire air routes. This includes a further grant of £125,000 to the Government of Newfoundland towards the cost of the air base at Botwood. Provision has also been made for a contribution to the proposed base at Portsmouth in accordance with arrangements provisionally negotiated with the Municipal Authority.

As a result of a Governmental conference in Wellington, New Zealand, in the autumn, proposals have been formulated for the establishment of a Trans-Tasman air service, as an extension of the England-Australia service, by a joint company representative of the interests of Great Britain, Australia and New Zealand. These proposals are now under consideration.

For some years increasing attention had had to be given to the question of providing for the development of civil aviation within the United Kingdom in the manner most advantageous to the requirements of the various aviation interests concerned, and at the same time most desirable from the public point of view; and provision has been made in recent Air Estimates for a measure of assistance to be provided from public funds, in the form of the establishment of a number of State radio installations for the benefit of aviation, at certain selected centres. In order, however, to secure that more adequate consideration should be given to the question in all its aspects, an inter-departmental committee was appointed, as indicated in the Memorandum accompanying Air Estimates, 1936, under the chairmanship of Sir Henry Maybury.

The recommendations made have now been fully considered by His Majesty's Government, and those which involve action by the Air Ministry have been approved in principle.

Following on the approval of the recommendations of the committee, a sum of approximately £100,000 has been included in these Estimates under the appropriate subheads, mainly as a first instalment of the cost of giving effect to the recommendation that the radio and control organisations which are necessary, should be provided at State expense.

Since its opening in 1928 the aerodrome at Heston has played an important part in the service of Civil Aviation, and it is clear that this aerodrome to-day provides essential facilities both for internal and for international purposes. Information was received that the owners of the aerodrome had decided to restrict their activities and to dispose of part of the airport. After endeavours had been made to induce the local authorities concerned to acquire the aerodrome as a municipal airport a decision was reached and announced to Parliament that the Air Ministry, subject to the requisite Parliamentary sanction being obtained, should purchase the site, together with a sufficient area of adjoining land, for an enlarged airport, in order to preserve the site from being built over. Provision has accordingly been made for expenditure on this service, among other purchases, during 1937.

The Bill, referred to in the Memorandum accompanying the Air Estimates of last year, for amending the Air Navigation Act of 1920 and giving effect to certain recommendations of Lord Gorell's Committee, was duly passed and received the Royal Assent on July 31st, 1936, as the Air Navigation Act, 1936. In accordance with Section 2 of this Act a new body has been set up, to which certain functions now exercised by the Secretary of State for Air will be devolved. The body will be known as the Air Registration Board. It has been agreed between the Air Ministry and the interests concerned, with the approval of the Treasury, that four-fifths of the deficit incurred by the Board in connection with this work during the first five years of operation, shall, subject to a maximum total payment of £60,000 over this period of years, be met from Air Votes.

A sum of £35,000 has been allowed in respect of subsidies to light aeroplane clubs in 1937. This should allow further clubs in addition to the 48 clubs approved at present to be admitted to the new subsidy scheme, which will replace the present scheme at the end of March, 1937. £5,000 has again been included as subsidy for the development of gliding.

Meteorology

The net provision made for the Meteorological Service is £248,000, representing an increase of £67,000 over the figure for 1936. The increase is directly due to the expansion of the Royal Air Force and to the development of British civil air transport at home and abroad.

The use of civil air transport as a rapid means of world communication is demanding increased international co-operation in the meteorological field, and Regional Commissions, on which the Empire is actively represented, have been formed within the existing International Organisation to deal with local aspects of the application of meteorology to aviation. In close association with these international arrangements an extended meteorological organisation is being created for Empire air routes by co-operation between the meteorological departments of the Empire. While this organisation as a whole is being provided on a co-operative basis, payments will be made to certain Governments (mainly Empire Governments) for certain special services. Provision for these payments to the amount of £19,000 is made in a new subhead.

Air Ministry

Vote 10 (Air Ministry), at a net total of £1,250,000 shews an increase of £210,000 over the provision for 1936.

The conditions of work at Headquarters have increased in intensity. There is not only the growth in the volume of the work in all departments of the Ministry, but the expansion programme is producing new problems as it proceeds, both for the Air Staff and for the administrative services. These factors have necessitated the addition of staff in all grades.

A new directorate for assisting the supply work of the Ministry—the Directorate of Aeronautical Production—was created in April last, and has proved of great value in the handling of production problems.

FAULT-DETECTION in LIGHT ALLOYS

Some Modern Methods Described

By E. JOHN PIKE,
Research Librarian, High Duty Alloys, Ltd.

FEW readers of *Flight* will need reminding of the importance of high-quality light alloys in the construction of modern aircraft. In the monocoque and semi-monocoque types of construction in use to-day they play an increasingly large part and are used for frames or bulkheads, stringers, spars, ribs, skin, and a large variety of smaller parts for fittings and controls. Their use in aero engines, too, is now highly developed, among their many applications being crankcases, cylinder blocks and barrels, cylinder heads, pistons, connecting rods, and all casings and covers. Lastly, the latest types of variable-pitch airscrews are built almost entirely of light alloys, other materials being used only in very highly stressed components.

To fulfil the important functions which light alloys play in these parts, it is necessary for them to be of consistently high quality. Hence it has become imperative not only that great care be taken in their manufacture, but that their properties be constantly checked to ensure that no defective material is used.

The first important consideration in this connection is composition. This, in the highly developed light alloys, must conform to narrow limits known to give optimum properties; careful and complete chemical analysis must therefore be carried out on raw materials, hardener alloys, and on finished alloy mixings to ensure absolute purity of materials and freedom from impurities and segregations.

Correctness of composition, however, does not alone ensure the attainment of optimum properties, as the methods of manufacture, casting, working, and heat treatment temperature can produce wide variations. Hence aircraft material specifications include, besides chemical composition, lists of mechanical properties required.

Having reached a stage in the course of manufacture where the material has passed through all treatments which may affect its properties, all parts are tested for hardness, and representative samples from each batch are tested for tensile properties.

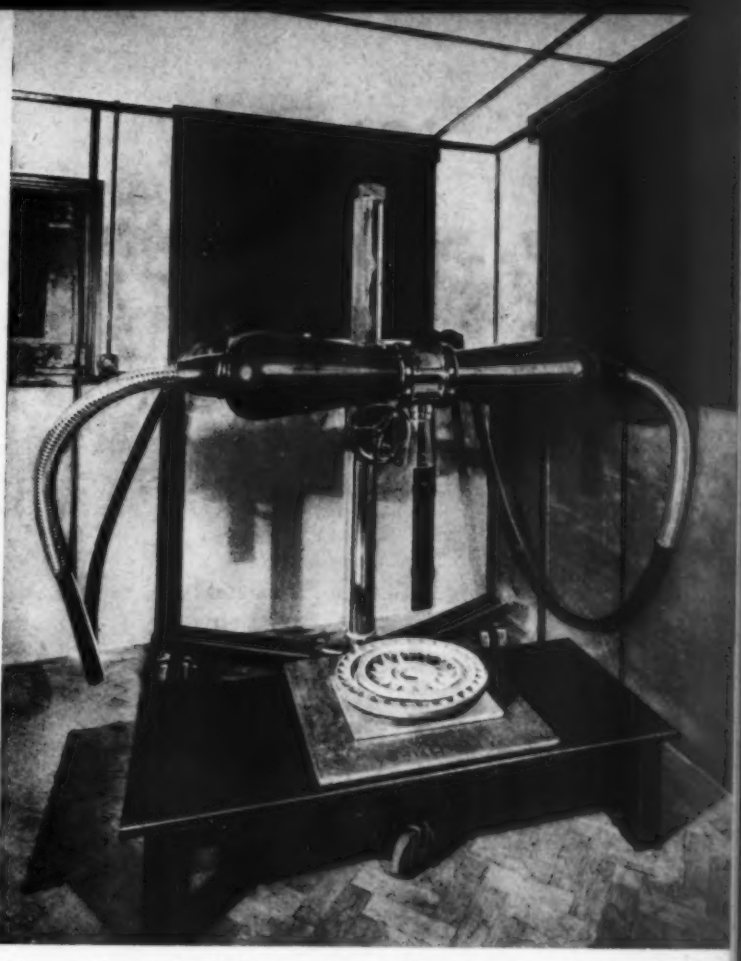


Fig. 1. Philips 200 kv. X-ray tube used for detection of flaws in castings.

In the case of wrought material it is usual to cut tensile test pieces from a certain percentage of the parts, but where the parts are so large as to make this impracticable, test pieces are taken from separate bars which have accompanied the parts through their various manufacturing processes and which in some cases are attached to the parts themselves.

With castings it is now a universal practice to use separately cast test bars from standard sand-lined moulds, the dimensions of which are laid down in the specification. These bars are intended to indicate the quality of the material, the accuracy of pouring and heat treatment temperatures, etc., rather than the actual properties of the castings which they represent; the characteristics of the latter may vary slightly on either side of those of the test bar.

In the casting of metals and alloys it is always possible that internal inclusions or cavities may occur, and these cannot be detected by ordinary inspection methods; while they may in most cases be reduced to a negligible degree by the employment of special technique, their absence can never be entirely guaranteed, and therefore important parts are examined radiographically so that these defects may be detected and the parts in which they are found rejected.

The X-ray plant shown in Fig. 1 is capable of detecting faults in castings up to 12in. thick in aluminium alloys, and up to 16in. thick in magnesium alloys.

Two methods of X-ray examination are employed, the first of these being the photographic method, in which the part to be examined is placed at some distance from the X-ray

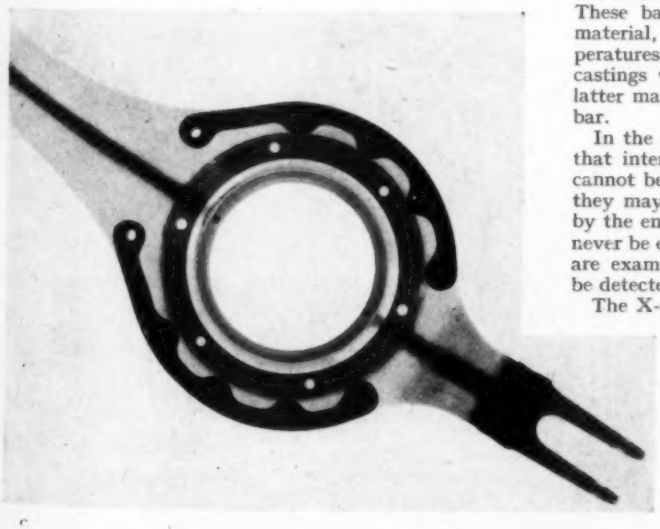


Fig. 2. Radiograph of a control column casting.

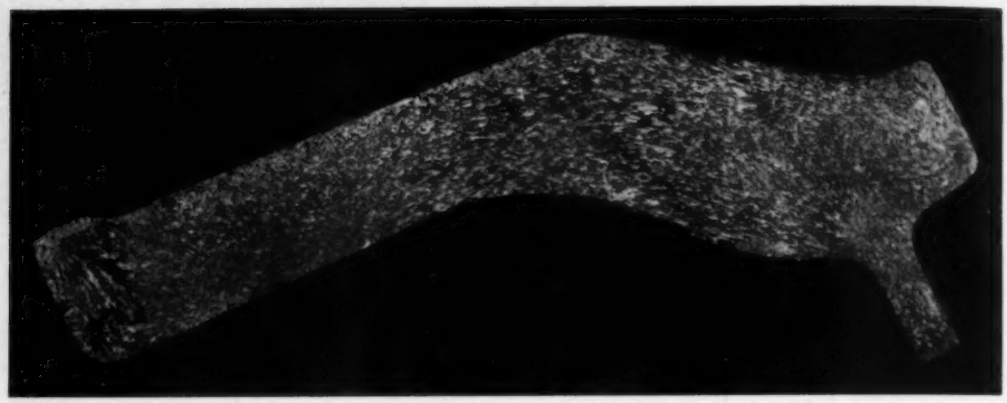


Fig. 3. Macrophotograph of a section through a reduction gear case stamping.

tube, a cassette containing a sensitive film between two intensifying screens being placed on the opposite side of the part. When developed, the film shows dense inclusions as light areas, and cavities as darker ones. The purpose of the intensifying screens is merely to cut down the time required for exposure, which they do by glowing or fluorescing, and emitting rays within the range of the visible spectrum. Fig. 2 is a positive print taken from an X-ray film of a casting.

The second method is visual examination, which is carried out by replacing the film with a fluorescent screen (covered by lead glass to protect the operator), on which the X-ray image of the part becomes visible to the eye. This process, while being the quicker of the two, is the less accurate, and will not show such fine defects as will the photographic method.

X-ray examination is not confined to castings, although it is more essential in their case. Forgings also are frequently examined, not so much for the defects mentioned above, which are very rare in these forms, but for internal defects, such as cracks, folds, and segregations of constituents.

"Macro" and "Micro"

A further and very important branch of testing is metallography, which includes macro-examination, micro-examination, and crystallography. This branch, while making use of highly developed scientific instruments such as the microscope and X-ray spectroscope, depends primarily on the technical knowledge and experience of the metallurgist.

In the macro-examination the parts are sectioned, polished, and etched to reveal the crystal distribution. Whenever a new part is manufactured or a new manufacturing process is developed, a series of macro-examinations are made in order to ascertain that the grain size is correct, and, in the case of forgings, the method is indispensable to determine whether or not the grain flow is such that it will give optimum strength to the part. Fig. 3 shows a macrophotograph of a section through a reduction gear case stamping, and illustrates the grain flow, which is of great importance both as regards successful manufacture and physical properties.

Telling the Story

Micro-examination is one of the most important of all tests, since the experienced metallographer can deduce the cause of many a failure from a single specimen. He can detect variations in composition, faults caused by incorrect casting or working methods, and can tell to what temperatures parts have been heated in manufacture or in use. Figs. 4 and 5 show the effect of overheating in heat treatment, the eutectic in Fig. 5 having been melted and caused to form globules at the grain boundaries.

One of the youngest of all metallurgical instruments, the X-ray spectroscope, shown in Fig. 6, goes still further into the crystalline structure and is used to investigate the submicroscopic structure of the materials; by measurement of the distance between the atomic planes, the size of the primary crystals, etc., it is possible to determine the extent of age-hardening and the magnitude of internal stresses retained by a part from any stage of its manu-

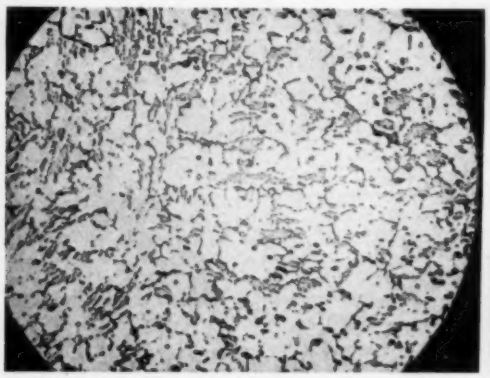


Fig. 4. Microphotograph of die-cast Hiduminium R.R.53, showing structure after correct heat treatment at 530 deg. c.

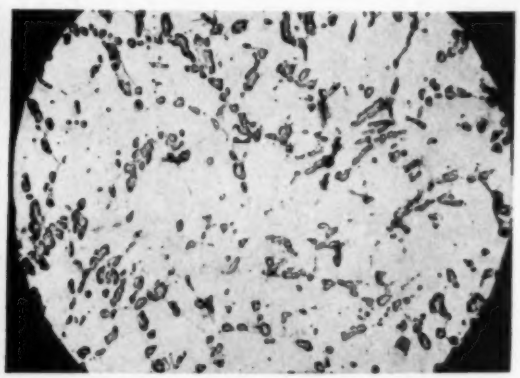


Fig. 5. Microphotograph of die-cast Hiduminium R.R.53, showing the effect of overheating to 550 deg. c.

Fig. 6. Metallography room, showing the Vickers projection microscope (left) and the Philips apparatus for crystallographic investigation.

facture. The technique of this form of examination is as yet in the early stages of its development, and it will be, perhaps, many years before its use may be fully exploited. For the present, however, it forms a very useful addition to the range of metallurgical investigations, and shows promise of enormous development.

Apart from the testing methods described, which have for their object the detection of faults in light alloy parts, there is the more important aspect of research, by means of which it is attempted to reduce the defects to a minimum by the improvement of materials and methods.

While this aspect of the problem does not really fall within the scope of this article, it is felt that its importance should not be overlooked, since it is through the efforts of those engaged in this work that the high strength and quality of the light alloys of to-day and to-morrow have been, and will be, attained.

SOME RECENT BOOKS

Aces and Kings, by W. L. Sutherland (John Hamilton, Ltd., 7s. 6d.)

MR. SUTHERLAND, who has written this most entertaining book in collaboration with Norman Ellison, has at least one great virtue; he does not describe his characters like so many head of cattle, but rather introduces the reader to them, intimately and informally, and so reveals in their true light the men with whom he came in contact as a pilot of No. 67 Squadron (Australian) in Palestine during the war. And a grand set of fellows they are, pulling off some of the most amazing stunts and conceiving some astounding means of helping to win the war.

We meet such figures at Ross Smith ("Hadji"), are given glimpses of the great Lawrence himself and come into contact with gentlemen from the enemy forces. The author has many a tale to tell of them, and very well he tells it. in the best Australian manner.

The appalling carnage wrought by machines of the R.F.C. on two Turkish armies is vividly recounted in a chapter "Nine Miles of Dead"; there is food for thought here on the potentialities of the low-flying "attack" machine.

Several names which figure in the book are still "in the game," notably "Biffy" Borton, Hudson Fysh, Adrian Cole and E. A. Mustar.

An Airman Remembers. By Hans Schroder, translated from the German by Claud Sykes. (John Hamilton, Ltd., 10s. 6d.)

AT present there is a fashion for air books about the war, and that perhaps is why this author chose his title. For part of the war he was an observer in the German Flying Corps on the Eastern Front, but in the course of the four years of slaughter he was many other things as well, despatch rider, machine gun officer and air intelligence officer. He did gallant work as a mounted despatch rider during the German advance from Mons, and was granted one of the lower grades of Iron Cross. His object, he admits, was always to get some special job "away from the herd," and he was remarkably successful. On the whole he seems to have enjoyed his war.

Baden-Baden was his native town, and in his writings and his reflections he displays a distinctly South German spirit. One feels that one would like this author if one were to meet him. The book contains vivid descriptions of various sides of the war which were rather off the beaten track of trench warfare and ordinary air fighting, and if its price were rather lower it might well prove popular.

My Flying Life. An authentic biography prepared under the personal supervision and from the diaries and papers of the late Sir Charles Kingsford-Smith; with a preface by Geoffrey Rawson. (Andrew Melrose, Ltd., 16s.)

IT gives one an eerie feeling when a man who has passed on from this life speaks from the pages of a posthumous autobiography. This book does not claim to have been written by Sir Charles Kingsford-Smith, but the story is told in the first person. That certainly makes it more exciting to read, and the claim that it is in essence his work is not questioned. It is a tale of many long flights and of many thousands of miles flown.

The outlines of the hero's career were given in *Flight* when hope of finding him and Pethybridge had to be abandoned, and there is no need to go over the same ground again. What gives the book a poignant interest is the number of times when the great pilot found himself in difficulties and wondered if he would come out alive; also his distress when T. W. Shortridge (pilot of the ill-fated *Southern Cloud*) and afterwards Charles Ulm vanished with their aircraft and left no trace. In the end the same fate befell Kingsford-Smith himself, and the reader knows from this book how he must have felt if he had time to realise that there was no hope for him. We may only hope that the end came too suddenly to allow of thought. Oh, if only Kingsford-Smith had stuck to his early principles of multi-engines and wireless!

Your Wings, by Assen Jordanoff. Funk and Wagnalls Co., New York.

PROBABLY one of the best books of its type that has been published, *Your Wings* is a comprehensive study of practical flying and flying matters written by an expert pilot and treated from a popular standpoint. The more complicated developments in aviation are clearly explained and illustrated in an unusual manner with references, where possible, to everyday applications of the theory involved. The scope of the book is such that the expert would find much of interest in its chapters and derive not a little amusement from the novel arrangement and treatment of the many subjects, while the layman who read and remembered all the information contained could almost consider himself an expert. Certain sections on oils and fuels, aircraft instruments, etc., are in themselves small text books, while the treatment of the theory of aerodynamics, v.p. airscrews and like subjects, is unique.

This book has not yet been published in this country, but is obtainable from the American publishers at a price of about 10s. 6d.

The Blue Book Electrical Trades Directory and Handbook. By Benn Brothers, Ltd., Bouverie House, Fleet Street. London, E.C.4. Price 25.

THE BLUE BOOK is a comprehensive directory to the electrical industries. The various sections give the names and addresses, telephone numbers and telegraphic addresses of every important organisation, firm and person engaged in the generation of electricity or the production and marketing of electrical goods for any purpose. Carefully chosen sections with thumb-tabbed index cards clarify the mass of information contained in the 1,400 pages. Divisions are included covering the British Empire, Northern Ireland and the United States of America.

The TREND of INVENTION

Recent Aeronautical Patents Reviewed

Two-Speed Gears and V.P. Airscrews

IN a De Havilland patent it is proposed to introduce a two-speed or even a variable-speed gearing between the engine and a v.p. airscrew.

In the example in the specification a two-speed gear is employed and either one or other of the gears is engaged by the movement of a clutch member in one direction or the other. When a variable-speed gear is used it may be controlled by means connected to the blade-pitch adjustment so that the pitch of the airscrew blades and the speed of the engine are simultaneously adjusted and the best combination always obtained.—*Patent No.* 454983: *Geoffrey de Havilland and The De Havilland Aircraft Company, Ltd.*

Cooling

PATENT No. 454664 deals with the air cooling of engines housed in wing nacelles. Air inlets are provided in the leading edges of the wings and air is led from these inlets by a conduit forward to the engine compartment, after which it passes out through suitable openings in the sides.

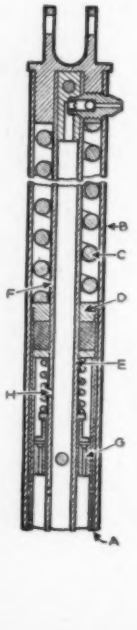
The air inlets in the wings are so situated as to utilise the airscrew as a cooling fan. They may also be arranged so that the inflow of air is greatest when the machine is climbing, and therefore when the greatest cooling effect is required. The size of the air inlets may be varied at will to control the degree of cooling.—*Patent No.* 454664: *Geoffrey de Havilland and The De Havilland Aircraft Co., Ltd.*

Shock-Absorber Struts

A SHOCK-ABSORBING strut, patented by G. H. Dowty, is composed of two telescoping tubes, one of which (A) slides in the second one (B). A spring (C), mounted in the longer tube (B), abuts against the closed end (D) of the smaller tube (A) and forms the resilient element of the strut. A closed chamber (E) of some length is formed in the end of the smaller tube (A), bounded at each end of two packing glands and this space is filled with liquid. Through this space a hollow tube (F) passes, which is attached to the outer telescopic tube and which carries a fixed piston (G) which works up and down in the liquid-filled space between the two packing glands.

Restricted passages are formed in this piston, and the liquid has to flow through these when relative movement between the two main tubes takes place. On one direction of motion the restricted apertures are closed to give increased damping, the liquid then passing from one side of the piston to the other through holes (H) leading to the interior of this central tube.

The novel feature of the patent is the method of damping used, which can be incorporated in a strut in a simple and economical manner, the whole strut being easily formed in the undercarriage structure.—*Patent No.* 455719: *G. H. Dowty.*



The Dowty strut described in patent No. 455719. Compactness is one of the outstanding features.

Geodetic Construction

THE present patent is associated with two earlier patents (Nos. 388438 and 412232), both of which relate to Vickers' geodetic construction. This system, as many readers of *Flight* are aware, consists of longitudinal members which may form the wing spars, or the longitudinal main frame of a fuselage, in conjunction with two series of bracing members which connect the longitudinal members and which lie in geodetic lines on the surface of the wing or fuselage structure.

These two series of bracing members intersect each other and are deeper than they are wide and are so curved that their depth is always normal to the surface of the structure they form. When they are in this form the twisting and lateral forces produce compression in one set of members and tension in the other set. As they are rigidly attached at their points of intersection they balance the forces set up by the loading.

The present patent is particularly concerned with the method of securing the members at their points of intersection, gusset plates and angle pieces being used. The method adopted makes the geodetic members continuous between the longitudinals and they are so recessed that they fit into each other and are attached in the manner outlined above.—*Patent No.* 452726: *Vickers (Aviation), Ltd., and B. N. Wallis.*

Jettisoning Fuel

A SHORT BROS. patent covers a jettison valve designed for the rapid discharge of fuel from a tank which cannot, by reason of its position, be emptied by opening a discharge valve in the tank itself.

Bolted to an opening in the tank is the upper end of an outlet pipe, the lower end of which is attached, by means of a hose, to a second outlet pipe which extends vertically downwards to an opening in the side of the fuselage or wing of the aircraft. On the flange by which the first outlet pipe is attached to the tank a mushroom valve is seated on special packings and the stem of the valve passes through the side of the pipe, which is suitably bent to make this possible, and the valve is opened by a hand wheel and screw gear. In the closed position the pressure of the fuel in the tank assists in effecting a seal.—*Patent No.* 454820: *Short Bros. (Rochester and Bedford), Ltd., and A. Gouge.*

Flap Load Adjustment

IN addition to providing for the hydraulic control of the flaps by the pilot, patent No. 546863 provides means for their automatic adjustment in accordance with the aerodynamic pressure of the flaps themselves, and therefore according to the speed of the aircraft. This is effected by including in the control system a sealed air chamber which is separated from the operating liquid by a floating piston. The pressure in the air chamber is such that at a given speed of the aircraft the flaps are capable of moving into a neutral position, thus further compressing the air in the chamber, and the energy thus stored returns them to an operative position when the speed decreases. Thus, with the aircraft stationary, they may be set to their maximum displacement and as the speed increases so the flaps are gradually retracted, their position at all times being automatically adjusted to the flying conditions at any instant.

An alternative method of obtaining similar results was described in an earlier patent, No. 454490, granted to the same firm, but in this earlier method a source of compressed air was essential, whereas this necessity is eliminated in the later scheme.—*Patent No.* 456863: *Société d'Inventions Aeronautiques et Mechaniques.*

Tail-wheel Mounting

A TAIL wheel is mounted in such a way that it is capable of pivoting about an axis which is inclined in a direction forward of the vertical, while the main axis of the shock-absorber unit, to which it is attached, is upwardly inclined in the opposite direction, that is, towards the rear.

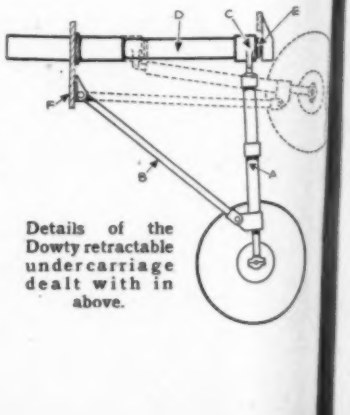
In an arrangement of this type the shock-absorber unit takes up the bending and twisting forces and, with the rearward inclination of the shock-absorber unit, the direction of yielding falls better in the direction of the shock forces applied to the tail wheel. If with this arrangement the tail wheel pivots about the same axis as the shock absorber, certain disadvantages arise, among which is the fact that the middle position of the tail wheel is unstable. These drawbacks are removed if the axis of rotation for the tail wheel is inclined slightly forward from the vertical.—*Patent No.* 454198: *Electronmetall G.m.b.H.*

Undercarriage Retraction

THE object of a forward-retracting undercarriage patented by G. H. Dowty is to provide a construction which is easy to install and which will contribute to the general structural strength of adjacent parts without adding substantially to the weight.

The accompanying illustration shows that it incorporates one or more shock-absorber struts A and a radius rod B. The top of the strut is attached to a collar C which forms the end of the jack plunger D. This plunger, in addition to sliding in the outer tube of the jack, also slides on a fixed internal stem E which is attached to some structural member of the aircraft. At the other end this stem E, which is rigid with the jack cylinder, is attached to some other fixed part F, thus forming a substantial interconnecting beam between two members of the wing structure. To the part F the radius arm is also pivoted. Movement of the ram of the jack causes retraction to take place in the manner shown.

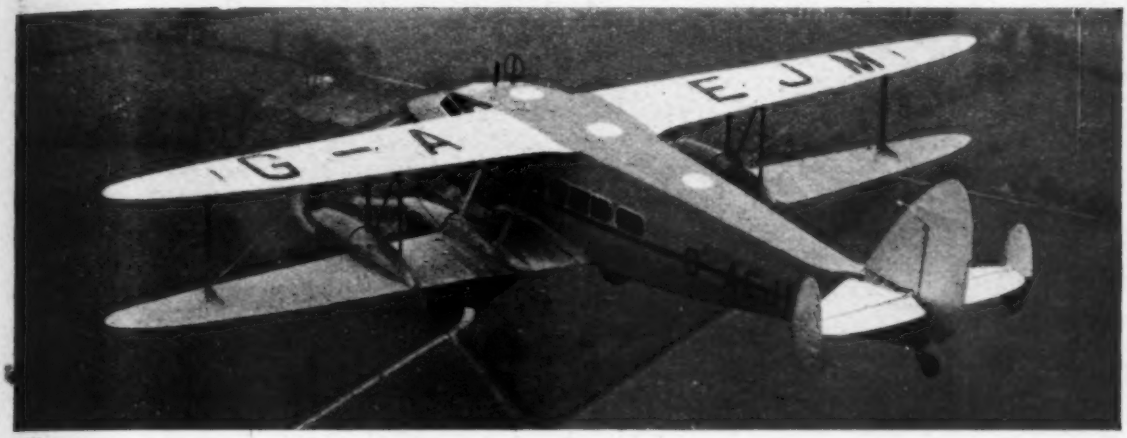
Other forms of construction are shown for rearward retraction, and also for a two-jack forward retraction. In these arrangements the jack is rigidly supported against loads due to compression or tension in the radius rod at all points during retraction. It can also form a structural part of the aircraft.—*Patent No.* 455384: *G. H. Dowty.*



Details of the Dowty retractable undercarriage dealt with in above.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



THE LATEST EXPRESS : This aerial view of the D.H. 86B—actually one for Wrightways of Croydon—clearly shows the modifications that have been made, in the interests of improved full-load stability, to what used to be known as the "empennage." (*Flight* photograph.)

THE WEEK AT CROYDON

Departures : Emergencies and Otherwise : Multiplication : Super Transport

THERE was a real rush charter job for Olley Air Service last week when a couple of people left London for Croydon by fast car, leaving somebody to 'phone through for a machine to take them to Cardiff. Capt. Midgeley stood by and set off the moment his clients arrived and landed on the sands at Cardiff (afterwards flying to the aerodrome) in time for two elder brothers, his passengers, to rescue a younger and more adventurous one who, it is alleged, was more or less running away to sea. So great was the hustle on this occasion, I believe, that even Capt. Olley, famous for his slow and stately stride, was seen to break into a run.

Croydon has lost yet another of its original control officers, for Capt. J. P. Morkam, D.F.C., until recently A.O.2, Croydon, has gone to Heston to replace Mr. (Jimmy) Jeffs, who, as recorded in *Flight* last week, has undertaken some mysterious Will Hay job, teaching the younger generation to be as capable and efficient as he is himself. Capt. Morkam will be greatly missed at Croydon, for he was one of those people on whose shrewd judgment and common sense people placed the utmost reliance. Another leaving member of the Croydon Air Ministry staff is Mr. L. Thomson, of the Communications Office, who is to take up an appointment with "Works and Buildings" Stanmore. Ever since I remember Croydon, and that is since the first day the authorities kindly presented civil aviation with a derelict R.A.F. aerodrome (with all the buildings facing the wrong way, and so constructed as to be impossible, or nearly so, for our purpose), Mr. Thomson has been a cheerful, active and forceful member of the community. I am not sure he is not our oldest inhabitant, for he was at Hounslow before Croydon existed as a civil aerodrome, and has been in the Communications Office since 1919. When you realise what "communications" mean to air transport companies, and how highly efficient is the Croydon branch of that intricate business, you may measure the debt which civil aviation owes to such a man.

The Air Ministry, at an estimated cost of £550,000, has acquired Heston. Reasons given by the S. of S. for Air are that the area provides essential facilities both for internal and international purposes, and that the site was purchased to prevent it from being built over. How many times a year is the place used as an emergency aerodrome? Pilots will not fly past Croydon into suburban smoke-fog, pierced here and there by church spires and chimneys, to risk encountering gasholders, and if the weather at Croydon is bad they need emergency airports on their routes. Why not buy Gravesend, too? By the way, I hope they have acquired the famous gasholder for storing rose-tinted Parliamentary speeches in their natural (or gaseous) condition.

Big Business

Somebody has been talking about running eleven daily services to Paris this summer. I do not know what services there will be on such popular routes as that to Zurich, but I hear K.L.M. will run seven or eight services a day into and out of Croydon. On the line between Milan and Amsterdam, which, of course, links up with the London service, there are three partners, D.L.H., K.L.M. and A.L.I., and, for the first time, this year the Italians will fly as far as Amsterdam. Perhaps we shall be welcoming them at Croydon before long, just as we expect the Swedish A.B.A. to operate regularly in and out of Croydon fairly soon. Some of the names of the special air lines scheduled for next summer have attractive names, which should give publicity managers and commercial artists considerable scope for their innate ingenuity.

Personal Airways now possess a super-luxury D.H. Rapide to take three people. You know the sort of thing.

Commercial Aviation

Touch button "A" and you get a measure of Old Vatted Glenledlie, whilst button "B" directs a sparkling stream of soda water into the left ear. It is a fact that it pays to sacrifice load to make people really comfortable in the charter business.

A *Notice to Airmen* says that weather messages from Croydon will be in "Q" code, interspersed with plain language as necessary. The example given is: QAM 1300 GMT GED. Occasional rain QBA 4KM QBB 400 M SOL 9/10 QAN NE 10KM QFE 1000MB. But is so much plain language necessary? Anyway, there should be a code-group for anything so normal as occasional rain and another, this winter, for a steady downpour.

Recently K.L.M. had an urgent appeal for a special machine from Amsterdam to Aden. Everything had to be arranged in a great hurry, and quite a lot of the arrangements had to be made in London. It is pleasant to know that every one concerned gave K.L.M. the utmost assistance, and that red tape was swept aside as much as possible. The Air Ministry civil side, the R.A.F. and Sudanese Government officials vied with one another in helpfulness.

A. VIATOR.

New British Airways Appointment

MR. W. E CROOK, who, for four and a half years has been radio instructor at Air Service Training, Hamble, has been appointed Wireless Technical Officer for British Airways.

Another Long-distance Experiment

ON March 4 *Caledonia* made another non-stop flight between Alexandria and Southampton. She left at 12.30 a.m., passed Sardinia at 10 a.m., Marseilles at 12.20 p.m., and reached Southampton at 3.45 p.m.

Dessau—Bathurst Non-Stop

AFTER being in the air for twenty-six hours a Junkers 86 landed at Bathurst on Thursday of last week having flown non-stop from Dessau. The original intention was to fly through from Germany to South America, but some unspecified trouble caused the machine to turn back to Bathurst when some 375 miles over the South Atlantic.

Soviet Long-distance

NEW air lines to be opened in the U.S.S.R. this year include the Moscow-Leningrad, Moscow-Tashkent, Moscow-Vladivostok services, and a seaplane service from Odessa to Batum. Radio beacons will be installed all along the Moscow-Vladivostok line, to enable maintenance of a regular passenger service over the longest air route in the world. The flight from Moscow to Tashkent will be made in 24-26 hours.

Navigational

THE following candidates have passed the last examination for Second-class Navigators' Licences, 1937:—Bristow, P. M.; Cliff, S. B.; Collins, H. M. B.; Govett, V. G.; Griffiths, W. N. C.; Hall, J. S.; Harris, T. R.; Houlder, C. B.; Jones, I. ap. I.; Lloyd, C.; Martin, H. H.; Moss, G. P.; Musson, G. B.; Needham, R. T.; Prowse, B. O.; Raubenheimer, D. B.; Ray, J. E.; Roberts, O. G. E.; Samuels, J. A.; Sanders, W. G. M.; Smith, S. R. R.; Stewart, T. A.; Tettenborn, P. A. de G.; and Turner, D. E.

Seventy-one candidates sat; twenty-four passed.

More Self-navigation

THE three D.H. 86 machines owned by Misr-Airwork are to be fitted with Marconi direction finders. This equipment is, in fact, already installed in one D.H. 86B which was recently flown out to Egypt, and the other two 86s are to be similarly equipped.

Though ground radio stations are now either arranged or projected at Cairo, Alexandria, Suez, Luxor, Mersa Matruh and Dakhla, the new equipment is independent of such organised co-operation.

Belfast and Dublin

WORK is to start immediately on the erection of a large hangar on Belfast's new airport at Sydenham. The high tension cables and pylons in the neighbourhood of the site, which hitherto prevented a "public use" licence being issued to the airport, are to be removed. A total area of nearly four hundred acres has been reclaimed, and of these one hundred are ready for immediate use.

The site is within five minutes of the centre of the city, and a stretch of water capable of accommodating flying boats of any size is available within half a mile of the aerodrome.

The Dublin Corporation and County Council have now arrived at a provisional agreement concerning the initial cost of the airport at Collinstown. The County Council is to be responsible for 11½ per cent., the Corporation 38½ per cent., and the remaining 50 per cent. is to be provided annually by the Government

The Air Registration Board

THE Secretary of State for Air has appointed Sir Laurence Philipps, Bt., J.P., to serve on the Air Registration Board in the capacity of an "independent person," and Flt. Lt. R. H. Stocken, M.I.Ae.E., R.A.F.O., to serve as a "person who has had not less than five years' professional experience as a pilot of civil aircraft."

New Services in India

ARRANGEMENTS have now been completed for regular air services to be operated between Bombay and Poona and Bombay, Ahmedabad and different parts of Kathiawar; the services will start as soon as the aerodromes at Rajkot and Bhavnagar are completed. The company concerned is Air Services of India, floated by Mr. P. M. Kabali.

The New Cannes Airport

CANNES aerodrome, which has been undergoing complete reconstruction and enlargement, is to be reopened next week. The daily Air France service to the Riviera, which, during the period of repair work, has used a car service for conveying passengers between Marseilles and Cannes, will, therefore, be returning to the use of this airport as their terminus. The general improvements to the site, which have been carried out so as to make it suitable as a training centre under the French Air Force expansion scheme, will enable Air France to land their larger machines there.

Landplanes for the Atlantic?

THERE is a distinct trend of technical opinion towards the idea that landplanes will, after all, be used for the North Atlantic service. Two reasons are given for this change of front. The prevalence of ice masses in the vicinity of Newfoundland, and on the stretches of water suitable for flying-boat harbourage there, will prevent the region from being used by boats during several months of the year. Secondly, the length of the ice-free Bermuda-Azores route is disproportionately great.

The machine which will be used for the landplane experiments is, of course, the D.H.91 (Albatross) and the Air Ministry has ordered two for this purpose. In addition to the long-range version, the D.H. Company is building Albatross machines for long-distance passenger-carrying.

It is expected that the first North Atlantic flight by an Albatross will be made in September, when Hattie's Camp aerodrome should be ready for use. Kilconry aerodrome, adjacent to the Atlantic boat base at Rynanna, will not be ready by that time, and the machine may use the new aerodrome at Dublin. The possibility that Pan-American Airways also favour landplanes is suggested by the fact that when Mr. Juan Trippe and Col. Lindbergh visited Ireland they spent fifteen minutes at the boat base, but more than two hours at Kilconry.

A study of the prevailing weather has shown that the much-discussed fogs of Newfoundland are not a serious threat, though here, again, the landplane has the advantage, because it would operate from an aerodrome which is located on a plateau well above sea level.

Undoubtedly, however, flying boats are destined for large-scale use on over-water routes where ice is not prevalent, and this summer's trial flying-boat journeys across the North Atlantic will provide much data of operational and technical value for flying boat and landplane alike. The Botwood base should be ready within a month.

Meanwhile Atlantic weather conditions are the subject of intensive study. Apart from the work going on in London, an Air Ministry met. expert is journeying back and forth on the North Atlantic in the s.s. *Manchester Port*, and the met. headquarters in Newfoundland are at Nooris Arm, near Botwood. The work there is especially directed to the study of ice-forming conditions.

A BABY TWIN

Two "Buried" Engines and Pusher Airscrews Among the Striking Features of the Two-seater Carden-Baynes Bee

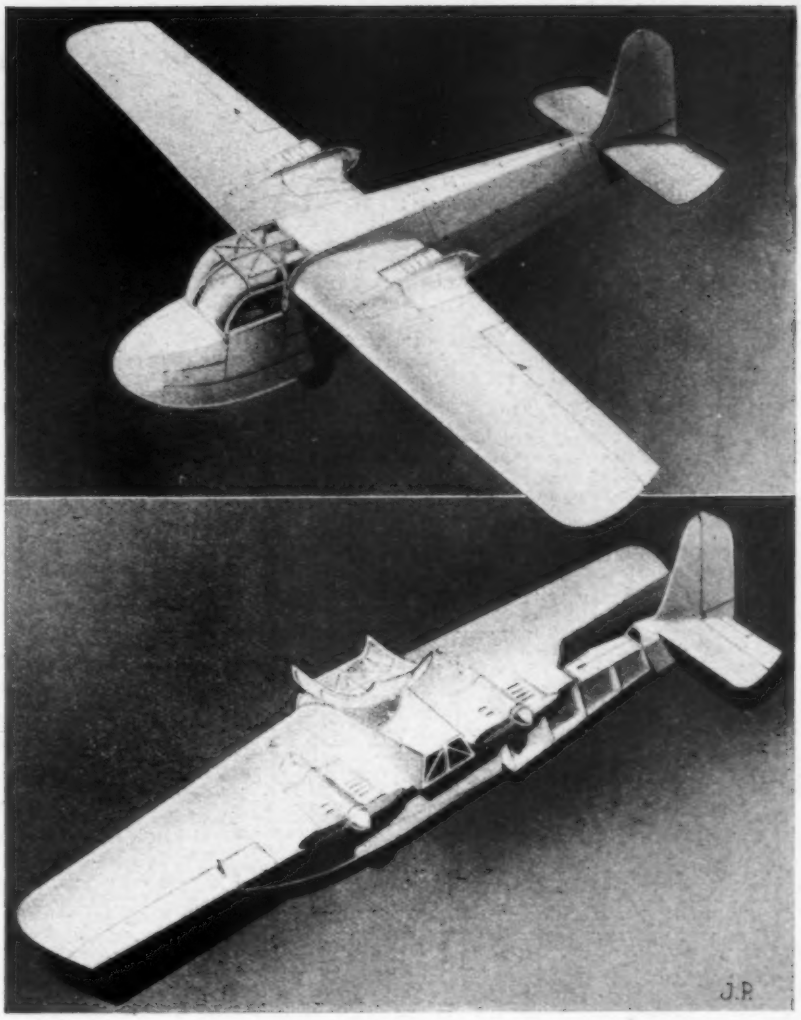
LAST March, Carden-Baynes Aircraft, Ltd., was formed to build a two-seater, high-wing, twin-engined monoplane, known as the Bee, to the designs of Mr. L. E. Baynes. Two special 40 h.p. Carden S.P.1 engines, evolved by the Carden-Baynes Company from the standard 30 h.p. Carden, were specified, being arranged to function lying on their sides and driving their pusher airscrews through integral extension shafts.

A one-man folding-wing system, the principle of which is well brought out in the accompanying sketches, is incorporated, and there is a door on each side of the cabin.

The construction is mainly of wood, and is not lacking in novelty.

It is estimated that the Bee will cruise at 100 m.p.h.

The main data are: Span 29 ft. 10 in., length 23 ft., height 4 ft. 9 in., weight empty, 880 lb., weight loaded, 1,350 lb.



These two sketches illustrate the ingenious "turntable" wing-folding system of the Carden-Baynes Bee.

Forthcoming Events

March 11. R.Ae.S. Lecture*: "Airscrew Blade Vibration," by Major B. C. Carter.
March 12. Leicestershire Aero Club: Annual Ball, Grand Hotel, Leicester.
March 12. Cinque Ports Flying Club: Annual Dinner and Dance, Grand Hotel, Folkestone.
March 16. R.Ae.S. Students' Section: Discussion on Stressed-skin Construction, R.Ae.S. Library, 7 p.m.
March 18. R.Ae.S. (Coventry Branch) Lecture: "Navigation," by Sqn.-Ldr. Godsave. Armstrong Siddeley Canteen, 8.15 p.m.
March 27-30. Yorkshire Gliding Club: Easter Meeting, Sutton Bank.
March 30—April 12. Ely Aero Club: Easter Instructional Course.
April 3. Rugby; R.A.F. v. Army, Twickenham.
April 8. R.Ae.S. Lecture*: "Control Problems," by Mr. A. G. Pugsley.
April 10. Aero Golfing Society: Martlesham Match.
April 22. R.Ae.S. Lecture*: "Power Plant Trends," by Mr. G. J. Mead.
May 6. Aero Golfing Society: Instone Trophy.
May 9. R.Ae.S. Garden Party, Great West Aerodrome, Hayes.
May 12-19. Austrian Aero Club: Austrian Whitsun Flight.
May 13. Leicester Airport Coronation Air Display.
May 15. Cardiff Aero Club: Coronation Rally.
May 15-18. Yorkshire Gliding Club: Whitsun Meeting, Sutton Bank.
May 26—June 6. Brussels Aero Show.
May 27. R.Ae.S. Wilbur Wright Lecture: "Turbulence," by Dr. Theodor von Karman. Science Museum, South Kensington.
May 29. Empire Air Day.
May 29-31. London-Isle of Man Race and Round-the-Island Contests.
June 4-6. York and Leeming F. Clubs: International Meeting, York.
June 12. Bristol and Wessex Aeroplane Club: Garden Party, Whitchurch.
June 20. R.Ae.C. of Belgium: Gordon Bennett Balloon Race, Brussels.
June 26. Royal Air Force Display, Hendon.
June 28. S.B.A.C. Display, Hatfield.
July 1. Aero Golfing Society: *Flight* Trophy.
July 3. Newcastle-on-Tyne Aero Club: London-Newcastle Race.
July 3. Ramsgate Airport, Official Opening.
July 10. Cardiff Aeroplane Club: London-Cardiff Race.
July 11. Italian Aero Club: Circuit of Rome.
July 15. Aero Golfing Society: Jubilee Cup.
July 17. Portsmouth Aero Club: Garden Party.
July 23—August 1. Swiss International Meeting.
July 24. Plymouth Aero Club: Devon Aviation Meeting.
July 31. Cinque Ports Flying Club: Folkestone Aero Trophy Race.
July 31—August 2. Yorkshire Gliding Club: Opening Meeting, Sutton Bank.
August 1-14. Yorkshire Gliding Club: Instructional Camp, Sutton Bank.
August 1-31. New York—Paris Air Race Flights.
August 2. Thanet Aero Club: Thanet Air Day, Ramsgate.
August 14-22. Yorkshire Gliding Club: Open Contest, Sutton Bank.
August 21. Thanet Aero Club: Aviation Meeting.
August 28 and 29. Cinque Ports Flying Club: Lympne International Rally and Wakefield Trophy Race.
September 10-11. R.Ae.C.: King's Cup Race.
September 12. Aero Club de France: Coupe Deutsch de la Meurthe, Etampes.
September 23. Aero Golfing Society: Cellon Trophy.

These lectures take place at the Royal Society of Arts 18, John St., London, W.C.2, at 6.30 p.m. Admission is by ticket obtainable through a member.

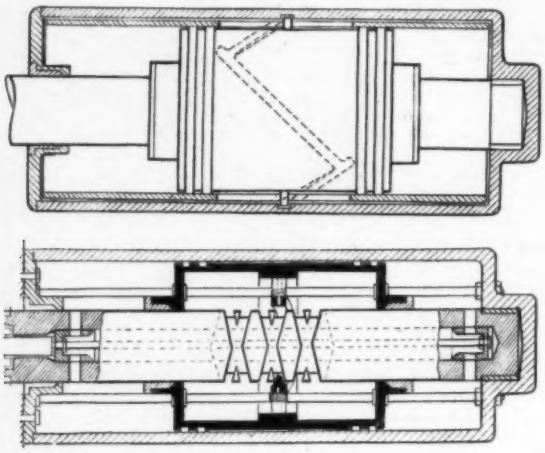
AN INFINITELY VARIABLE GEAR

Hydro-mechanical Device, Adaptable to Airscrew Hubs, Providing Semi-automatic Variation of Torque Ratio

A FORM of hydraulically controlled mechanical torque converter having infinitely variable characteristics over almost any range called for in vehicle transmission systems, has been designed by T. Watson Paterson, F.R.S.A., A.M.I.A.E., of 25, Sturdee Road, Liverpool, 13, who feels that it would lend itself to application as a self-contained and concentric coupling in an airscrew hub to provide a variable gear ratio.

It may be remembered that in his very thorough lecture to the Royal Aeronautical Society last year, Dr. H. C. Watts pointed out that for certain classes of aircraft a variable reduction gear ratio in addition to variable-pitch airscrew would be a necessity if full thrust horsepower was to be obtained. The incorporation of the Paterson torque converter in the hub of a v.p. airscrew would appear to offer certain problems, but investigation is proceeding.

The mechanism is, basically, a right- and left-hand (crossed) thread on the power shaft, on which is reciprocated a double-ended piston, the piston having inside its body a rocking nut which engages with the threads and travels up one and down the other continuously. Surrounding the piston is a cylinder which is free to rotate on the power shaft, but a continuous cam groove in the cylinder wall engages with studs on the piston (or *vice versa*) so that reciprocation of the piston results in rotation of the cylinder.



Two sections through the Paterson torque converter. In the upper is seen the reciprocating piston with its pins engaging the continuous cam groove in the outer cylinder. The lower shows the crossed thread on the power shaft, with its rocking "nut."

The overall reduction of speed between the driving shaft and the cylinder is, of course, a function of the pitch of the screw thread and of the cam groove. Thus, if the screw shaft rotates four times to one cycle of piston reciprocation and one piston cycle rotates the cylinder through half a revolution the ratio is 8 to 1, and so on. Of course, any ratio from, say, 1½ to 1 down to 30 or 40 to 1 may be selected, but whatever mechanical ratio is arranged becomes the lowest positive drive that will be provided and between it and a direct 1 to 1 ratio a hydraulic control gives an infinitely variable regulation.

This control is quite simply arranged. The double-ended piston reciprocates within, and rotates the cylinder. Obviously, if the reciprocation of the piston should be checked the whole assembly would be compelled to revolve as a solid mass at the speed of the screw driving shaft. To effect this impedance to piston reciprocation the spaces between the closed cylinder ends and the piston ends are filled with oil. A communicating duct is drilled through the driving shaft and controlled by a valve which opens or restricts both ends simultaneously. With the duct fully open the reciprocation of the piston is not impeded, the oil being transferred idly from end to end and the full mechanical "gear" reduction between drive shaft and cylinder is obtained. But as the duct is restricted the impedance to piston travel results in its tending to revolve with the drive shaft and in turn to carry the cylinder with it at the same speed.

Automatic Control

When the duct is closed completely the piston no longer reciprocates because the oil cannot be displaced, and the whole mechanism runs solidly as a unit. Actually the device can be made to function automatically, because if the oil ports and duct are dimensioned according to the power, speed and loading involved the restriction on oil transference from end to end of the cylinder will vary with the piston speed. Thus as the loading on the airscrew decreases the engine speed would tend to rise and with it the rate of the piston reciprocation. Beyond a certain rate the piston would be impeded by restriction of oil flow and the airscrew speed would then tend to rise, thereby imposing greater load on the engine, checking its increasing speed and re-establishing balance between power and load. External control, could therefore, be limited to complete closure of the transfer duct when stable conditions of normal power, speed and load were attained.

The mechanism, being entirely self-contained and concentric, should be adaptable to the hub of an airscrew. Should the hydraulic element fail for any reason, and particularly if the fluid should be lost, the low gear ratios (mechanical) would come automatically into operation.

CONCERNING COMPRESSION

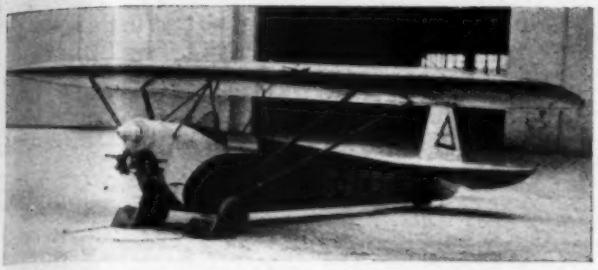
OF the scores of components associated with the modern aero engine, there can be few, if any, demanding greater experience and manufacturing skill than piston rings. It is with these rings that the British Piston Ring Co., Ltd., of Holbrook Lane, Coventry, is chiefly concerned in the aeronautical field, though a recent inspection of the Brico works, every detail of which seems to make for the utmost efficiency, brought to light a number of additional items.

Apart from piston rings and scraper rings made to specification 4K6 and in the Brilybdenum (to Air Ministry specification—DTD.277) and Brimol materials developed by Brico, one was shown, or told of, such items as cylinder sleeves centrifugally cast in special alloys for sleeve-valve engines, cast-iron bushes, cylinder head rings, bearing retainer rings, and similar rings for various duties made in hardened and tempered high-speed steel.

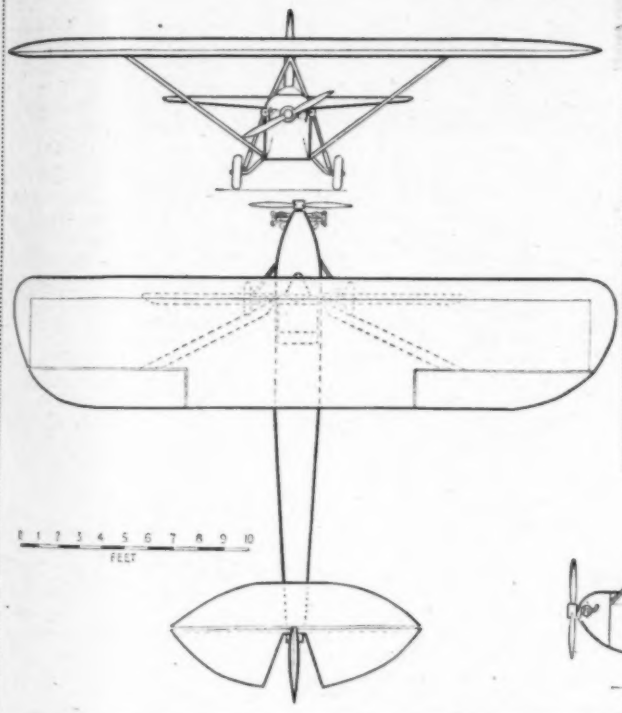
At the company's near-by foundry it was possible to see cast-iron piston-ring "pots" (from which the rings are cut) being formed on special centrifugal casting machines. The molten metal is thrown outwards to the wall of the mould by the centrifugal force set up by high rotational speeds, and the casting cools while rotating. Impurities such as dirt and slag automatically separate out so that they can be removed.

A subsidiary company to the British Piston Ring Co., Ltd., and adjoining their imposing premises, British Aero Components, Ltd., specialise in aircraft valves, including the sodium-filled type, for the manufacture of which the Wilcox Rich Corporation of Detroit have granted them the remaining exclusivity on the patent rights. Interesting examples of this type of valve were seen in hand for the new Alvis aero engine. These had stellited faces and nitrided stems, for which processes the plant has excellent facilities, and it was observed that they were also working the Nitralloy patent of plating the valves in conjunction with the nitriding process to accelerate the nitrogen penetration on austenitic steels, most of the material being to Air Ministry Specification D.T.D. 49. Great care was taken with material inspection by the acid etching process at various stages during the machining operations of the valve, for material flaws, and also to detect nitriding penetration.

LIVELY LIGHTWEIGHT

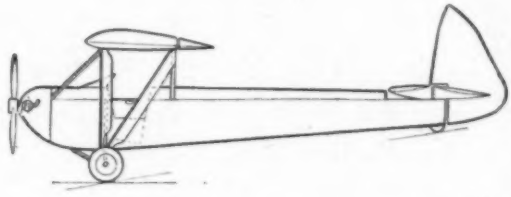


(*Flight* photographs.)



THE accompanying illustrations show the Luton Minor, designed for construction by amateurs, in its latest form with a single parasol wing. It may be remembered that the original Minor had tandem wings and was described in this form in *Flight* of December 10, 1936. In production a Sprite flat twin will be fitted, but any engine of about 30 h.p. is an alternative.

Seen at a demonstration last week with a 34 h.p. Anzani vee-twin, this prototype took off in about 12 seconds with a run of 100 yards. Top speed is in the region of 80 m.p.h., and the climb appears to be quite vigorous. In fairly choppy conditions the Minor seemed very steady, and as an aircraft should inspire considerable cross-country confidence. The makers are Luton Aircraft, Ltd., Gerrard's Cross, Bucks.



CAMBRIDGE AIR SQUADRON AT HOME

THE annual dinner of the Cambridge University Air Squadron last Friday was every bit as grand and as cheery a gathering as ever. For many old friends of the squadron it served as an introduction to the new Chief Instructor, Wing Commander C. E. W. Lockyer, who made an excellent host and is sure to be as successful and popular as his predecessors. It was unfortunate that Sir Philip Sassoon was not able to attend as principal guest, as he was still in quarantine, but Air Chief Marshal Sir Hugh Dowding took his place most efficiently and made an excellent speech when replying to the toast of The Guests. It was all the more enjoyable because it only touched lightly on higher politics; in fact there was nothing stuffy about it. Sir Hugh delighted his hearers by dividing the guests into two classes, the literary and scientific on the one hand, and on the other the brutal and licentious. And then, he added, there was the Press; he hoped that on that occasion at least they would belong to the former category. So be it!

The Vice-Chancellor, Mr. G. H. A. Wilson, O.B.E., proposed the health of the squadron, and Mr. J. F. Fraser, of Pembroke College, showed promise of an oratorical future in his reply. His *sang froid* was quite undisturbed by the large number of his audience or by the dignity of those at the high table, among whom were numbered the Master of Corpus Christi, the Master of St. Catherine's, Sir Geoffrey de Montmorency, G.C.I.E., K.C.S.I., and Professor Melvill Jones, all of the literary and scientific order, besides Air Marshals Sir Arthur Longmore and Sir Frederick Bowhill and Air Vice-Marshal Gossage—who, presumably, all come under Sir Hugh Dowding's brutal and licentious category. The Master of Peterhouse, Field-Marshal Sir William Birdwood, must figure in both lists. The guests were done proud by the University Arms Hotel where the dinner was held.

For Care-free Touring

THE recent Egyptian Rally may be said to have signalled the opening of the year's foreign touring for private owners, so the moment seems opportune to mention the B.P. credit-book.

Supplies of B.P. aviation products can be obtained abroad on credit terms by holders of these "passports," as they might almost be called. They smooth out all one's troubles with currency, customs, and a hundred-and-one odd things as only a local agent who wants to be helpful can do. Owners who are interested should apply to the Aviation Department of Shell-Mex and B.P., Ltd., Shell-Mex House, Victoria Embankment, London, W.C.2.

Topics of the Day

Demonstration—

LAST week a perfectly good and unusually interesting Dutch light aeroplane was crashed while being demonstrated before a group of news cameramen. The result was magnificent for the newspapers. We saw pictures of the machine, both while flying and after the accident, over somewhat sarcastic captions concerning foolproof machines. As I've remarked before, neither a car, a bicycle, nor a pram is ever foolproof.

I know little about this accident and nothing about the reasons for it. All I know is that this particular aeroplane had some very good points; that a picture of a crash is very poor publicity; that demonstration pilots often take certain risks in their endeavour to exhibit the exceptional qualities of some type; and that I was looking forward to the chance of flying this safety-first pusher in due course and in a normal manner.

Looking back over last year's flying meetings I can say that, with a few important exceptions, the demonstrations of light aeroplanes were nothing but exhibitions of the skill of particular pilots; that they rarely showed up the machines' real features; and that I was scared stiff. If a person who is reasonably used to such demonstrations is scared, then what of the general public?

I have seen people fling light aeroplanes about at zero altitude over the heads of the crowd and fly them in such a way that an engine failure would have left the pilot with no alternative to a sticky end, either for him or for the unfortunate populace. The risks were disproportionate. For the sake of a doubtfully effective display he was risking the possibility of a piece of adverse publicity which would virtually kill the future of the machine in the world at large. The risk to his own life is nothing to do with me. If he is foolhardy enough to take unreasonable chances, that is his own affair.

—Of What?

IN any case, so long as aircraft demonstrations consist largely of minor and major acrobatics, the public will continue to look on aeroplanes as sporting affairs for the use of the suicidally inclined—and having no possible connection with their own comparatively humdrum existence. Tree-fighting displays, even by the most accomplished pilots, affect me much as dirt-track racing did when I first saw it in this country—and if anybody says that the dirt-track displays and races have helped to sell a single motor cycle I shall laugh. Probably they have discouraged or frightened some thousands of prospective purchasers.

There is I am glad to say, a very distinct tendency nowadays for sales and demonstration flying to be carried out by the more sober type of pilot who is often club-trained. He realises that the prospective purchaser is not impressed by steep climbing turns and trick approaches, but by smooth, quiet and effortless flying, and by the unworried manner of the demonstration pilot himself.

The more I fly, the less I think of some experts as persons fit to give a considered opinion on any particular aeroplane. Watch one of them taking up a new type. Before the machine is clear of the aerodrome he points the nose in the sky and waggles the ailerons; the machine is still doing 70 m.p.h., but he is satisfied (or dissatisfied) that the aileron control is good near the stall. He then does a few steep turns, formates on some unsuspecting airline pilot (with a cabin full of passengers), comes in at an incredible speed, finds himself overshooting, swish-tails violently, and drops it from three feet. He has learnt nothing, but he has another type in his log-book.

Two machines that I know quite well have been remorselessly damned by such people—whose word is so often taken as final. I have flown each of them quite a lot, and, as an unconsidered and not unexpectedly skilful amateur, have had no trouble with them at all—largely because I made reasonable enquiries and took dual in each. Let it be put on record that one of the best and most experienced instructors, brought up on Siskins and the like, will never fly a new type without dual if this can possibly be obtained. Furthermore, he flies each new type with care and common sense, climbing in a straight line and at an adequate speed until he reaches the sort of height at which it is safe to start experiments which will really tell him something about the machine.

He should live to a ripe old age unless the trigger-fingers of our supposedly civilised fellow men itch too violently to be restrained. None of us will then live to any age at all—except, perhaps, the age of the neo-cave-dwellers. Given another million years, the remnants of western civilisation, if they are not absorbed by the black and yellow races, will then be ready to make the same mistakes all over again.

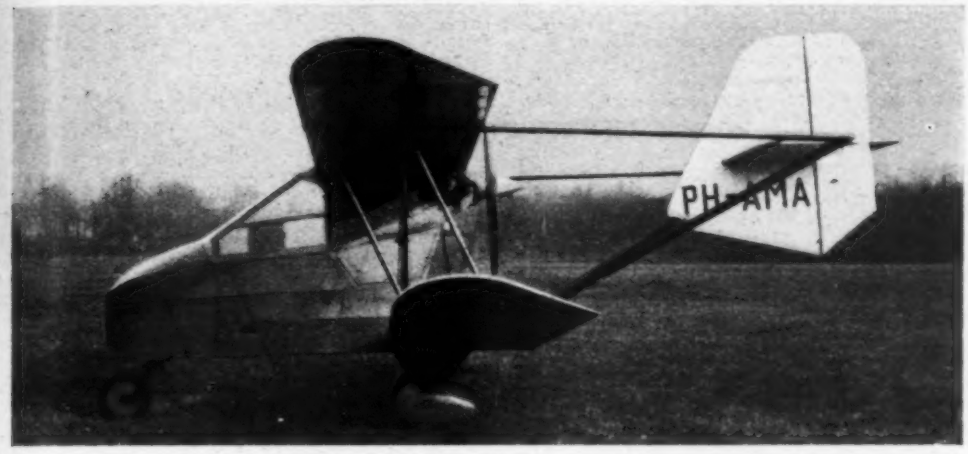
Second Thoughts

WHILE discussing, last week, the question of take-off reliability and the importance of running up an engine, I entirely overlooked the most important advantage of such caution. It prevents any possibility of a take-off with the fuel tap closed. The majority of machines will taxy a reasonable distance, and even become air-borne in such circumstances before the float-chamber and full lines are exhausted.

A full-throttle check will always disclose such an error, and will also give the necessary signs if some foreign matter has settled in the tap unions, or is partially choking the fuel filter. Even when an engine is below par one can run quite a long way across an aerodrome before the fact is properly realised.

INDICATOR.

FROM the CLUBS and SCHOOLS



AS IT WAS: The Dutch "safety-first" machine which was crashed while being demonstrated last week at Gravesend, preparatory to its serious introduction into this country. The Scheldemusch (Scheldt Sparrow), as it is called, is a single-seater cabin pusher which, with a 40 h.p. Praga B engine, has a maximum of 78 m.p.h. It has a steerable nose wheel and the undercarriage is arranged so that the tail cannot be depressed until full flying speed is reached. Either a "flown-in" or normal landing can be made, and slots, with differential ailerons, look after stalled safety in the air.

LONDON

AGAIN Hatfield had its share of bad weather last week, but in spite of this the Club completed 50 hr. 45 min. flying. For four consecutive days (including the week-end) no flying was possible. Messrs. R. H. Sandeman and O. Steenfeldt have gone solo.

C.A.S.C.

Last Wednesday week five members attended at Cambridge and took instruction on the school's Puss Moth. Mr. S. A. Dew went solo on this machine during the day. No flying was possible at Gravesend on Sunday owing to high winds and sleet squalls. Members attended a lecture given by Mr. H. Sale.

CAMBRIDGE

Flying times at Marshalls' Flying School for the week ended March 7 totalled 63 hr. 55 min. Messrs. Sisson and Walters have gone solo; the latter, along with Mr. Ramsay, has also passed his "A" licence tests. A good deal of blind flying has been done by members during the week, and cross-countries were made to Leicester and Hatfield. Mr. Clifton and Mr. Rigg have joined the school.

YORKSHIRE

For the week ended February 26 flying times at the Yorkshire Aeroplane Club totalled 12 hr. 35 min., but only 4 hr. 50 min. were logged for the week ended March 5, owing to the recent snow falls. A flight was made to Doncaster and back, and Mr. G. T. Rhodes, of Leeds, recently made his first solo flight. Visitors have included a Hillson Praga (G-AEEV) and Lord Londonderry's Monospar (G-AEPG).

LIVERPOOL

Weather conditions during February were exceptionally bad, but the Club was able to log 111 hr. 25 min. The total for the past week amounted to 24 hr. An informal dance will be held in the clubhouse at Speke on Grand National night, Friday, March 19, starting at 8 p.m. The Club will be closed on Good Friday, Easter Sunday, and Easter Monday. Both Hooton and Speke will be open on Tuesday, March 30.

BRISTOL AND WESSEX

Club aircraft flew 30 hr. 40 min. during the fortnight ended March 6. Mr. W. A. Lacy Tuck has gone solo, while Mr. J. H. Hickman has completed the tests for his "A" licence. Flt. Lt. E. W. Knowlden, of Plymouth Airport, has completed the blind flying course, and Mr. Stephen Carwardine has joined the club as a member. The Club lost the squash match with the Clifton Club by three games to two.

BROOKLANDS

Flying time for the week was 50 hr., the one fine day, Wednesday, being the busiest with 15 hr. Two first solos were accomplished by Messrs. A. W. Whittet and J. Lydall, whilst the week's new members were Messrs. Love, Cresswell, and Wood-Harrington, the latter a member of the Scottish Flying Club. A new private owner is Mr. A. F. Wigram, who has purchased a Leopard Moth (G-ACHB). Two of the new machines, part of the year's re-equipment scheme, have arrived, and these, together with the six other Gipsy Moths, are being kept very busy when the weather allows. Preparations for the cruise on the s.s. *Laconia* are complete.

REDHILL

Last week's flying amounted to 37 hr. 30 min., and Mr. A. Davies went solo.

DONCASTER

In spite of adverse weather conditions and the fact that one of the Club machines was undergoing its C. of A., a total of 7 hr. 45 min. flying was put in during February. The Club's second annual dinner and dance was held on February 23.

SOUTH COAST

Rather better weather has enabled the Club to do over 30 hours' flying during the past week. A large party is being organised to travel by air and road to the Cinque Ports annual dinner to-morrow (Friday). New members are Messrs. R. W. Wright and Mellstom.

HERTS AND ESSEX

Owing to February's rough weather, the 150-odd hours recorded was the lowest month's total throughout the past four years. However, since the advent of March more settled weather has been experienced, and the total for the past fourteen days was 86 hr. 12 min. The Stinson and Hawk have been out of service for renewal of C. of A., but the latter is now completed, and the Stinson is expected back on Saturday. New members are Messrs. W. H. Villiers, J. Isserverdens, A. G. Hill, R. H. Miller, and S. Saward.

HANWORTH

New members last week were Capt. Watkins, Mr. F. Appi, Mr. W. Barker, and Mr. S. Phillips. A large number of tickets for the Carnival Ball to be held at the Hanworth Park Hotel on St. Patrick's Night, March 17, have been sold. Two more Aeroncas are in commission after C. of A. overhaul, bringing the total up to six. Last week's flying totalled 47 hr. 10 min. Mr. G. Toth, who took his "A" licence at Hanworth, is now taking a course in blind flying, and Mr. F. Appi is also taking a "B" licence course.

NOTTINGHAM

Flying time for the week ended March 4 was lower than usual, owing to bad weather. Mr. J. H. Radford has completed his "A" licence tests. New members are Miss K. Baggaley, Mrs. J. Baxter, and Mr. F. Stenson. On Friday, February 26, a grown-up children's party and dance was held at the clubhouse, Mrs. Pyddoke taking the first prize for ladies, and Mr. P. Bradley for gentlemen. Other prize-winners were Mr. G. V. Simkins, Mr. and Mrs. G. Price, and Mrs. Baxter, all looking very juvenile. The last dance of the season will be held on Friday, April 9.

CINQUE PORTS

Flying hours for the week showed a slight improvement. Last Tuesday week the Club's Monospar co-operated with the Territorial Searchlight Brigade at Dover by flying 6,000 ft. for an hour while their searchlights attempted to pick up the machine. The Club has contracted for a considerable amount of co-operation flying. Mr. J. Bamber, ex-R.A.F. short service, has joined the Club in order to take his "B" licence. Once again Club members have chartered two eight-seater D.H. Rapides to convey them and their friends to the Grand National. The Club's dinner and dance takes place to-morrow (March 12).

Private Flying

BENGAL

The flying return of the Bengal Flying Club for the month of January was dual, 24 hr. 50 min., owing to the fact that the Club's pilot instructor, Flt. Lt. W. F. Lovering, left on January 7; there was no dual instruction after that date. One of the Club aircraft (VT-ACN) was badly damaged in a crash on January 26 while being flown by Mr. A. Mukherjee at Patna.

BORDER

During February the Border Flying Club machines flew 58 hr. 20 min. This is an increase of 11 hr. 10 min. over the corresponding month of last year. Miss Arckless and Mr. Bell have completed the tests for their "A" licence. Miss Arckless is the first lady member of the Club to take her "A." Several others are taking instruction and expect soon to follow in her footsteps. The aerodrome drainage scheme is in full swing and care is necessary by pilots unused to the aerodrome when landing. The area affected is marked by red and yellow flags.

PENANG

During January the Penang Flying Club flew 200 hr. 45 min., this figure showing a good improvement on the previous month. The monthly landing competition, held on January 31, was won by Mr. W. D. C. Erskine Crum, with Mr. A. J. Drake second. Ten pilots competed. Miss M. Miles and Mr. Liang have made their first solo flights, while Mr. J. M. Bradley and Mr. A. J. Forbes have passed all the tests for a Straits Settlements "A" licence. On January 3, Mr. and Mrs. C. Kelman arrived from Victoria Point in their Monospar on their way from England to Australia by easy stages. On the 19th three Vildebeests from No. 36 Squadron arrived from Singapore, and on the 20th Mr. D. S. E. Vines landed in a new D.H. Dragonfly which he had flown out from England for the Asiatic Petroleum Co.

NORFOLK AND NORWICH

Last week the Club's total flying hours reached 34, which is the highest weekly total this year. The activities of the commercial school for professional pilots have helped considerably to increase the number of hours. A large part of Flt. Lt. F. T. K. Bullmore's time is occupied with the commercial school; with navigation classes, which form an important part of the commercial pilot's training, and, as a consequence, a number of cross-country flights were made during the week. These were made by Messrs. R. D. Hesketh and D. Bradley-Watson, who took machines to Hatfield, Cambridge, and Ipswich.

The Club is organising a new summer and winter holiday scheme, whereby flying training goes with all the varied sports and pastimes which are available in the district. Details are given in a brochure which has recently been issued by the Norfolk and Norwich Club.

SOUTHEND

The Southend Flying Club have had a busy flying week. Mr. Rankin flew up to Hull on Wednesday, returning on Saturday, while Mr. E. Sarll has gone solo. Last Tuesday week the annual general meeting was held, Mr. A. W. Bevan being elected as chairman. A supper and smoking concert will be held at the clubhouse to-morrow (March 12).

WITNEY AND OXFORD

A successful dance was held at the Bear Hotel, Woodstock, on February 26. Amongst others present were Mr. Sacre, the Duke of Marlborough's agent, with a party of friends, Mr. L. A. Wingfield, Clerk to the G.A.P.A.N., Miss Frank, Secretary to the Guild, Mr. E. M. H. Slade, instructor to the Bristol and Wessex, and Mrs. Slade. It is proposed to form a Flying Committee to assist in the management of the Club, and a Sports Section for all connected with the aerodrome. The clubhouse is being moved to the new College buildings in order that it may benefit by the essential services, which should prove of great benefit to visitors.

KARACHI

The total flying time for January amounts to 188 hr. 45 min., including 1 hr. 35 min. night flying and 18 hr. 50 min. commercial flying. The training of "A" and "B" licence pilots has been actively continued and Mr. G. Grossenbacher and Mr. K. H. Bhaloo are to be congratulated on obtaining their "A" licences. Nine members holding "A" licences are under training for "Bs" and two "B" licence pilots are taking their training as pilot instructors. An inspector deputed by the Director of Civil Aviation of India visited the Club during the past month and examined some pupils who are undergoing training. The Pir Pagaro, prior to his departure for Medina, chartered one of the Club's machines for a flight to Hyderabad.

LEICESTERSHIRE

Members of the Leicestershire Aero Club flew 37 hr. 50 min. during February. First solos were made by Mr. R. A. Marks and Mr. S. P. Russell, while four cross-country flights were made. On February 26 Sqn. Ldr. G. H. Reid gave an interesting lecture in the clubhouse entitled "Blind Flying and the Automatic Pilot," at which some seventy members and their friends were appreciative listeners. The Leicestershire Aeronautical Co-ordination Committee, sponsored by the Club's President, Mr. W. Lindsay Everard, M.P., held its inaugural meeting and luncheon at the Royal Hotel, Leicester, on February 5. This committee is representative of all aviation interests in Leicestershire and was formed to co-ordinate all such interests with a view to prevent overlapping and to arrange mutual assistance.

Local Talent

IN the current issue of *The Pylon*, the D.H. Technical School magazine, there is, amongst a lot of other useful and/or amusing articles, one by Mr. R. L. Porteous on the tribe of the ultra-light. He appears to have flown every one except the Brawny, and he does not mince his words. There are, in fact, ultra-lights *and* ultra-lights.

The New Lympne

DURING the past few years considerable changes have been made at Lympne. Whereas there used to be only two small rooms for the benefit of Cinque Ports Flying Club members, one half-bay hangar with a small annexe workshop, and a wooden hut for the timekeeper, there now stands a bar three times the size of its predecessor, a restaurant of equal size, a reading room, a lecture room, instructors' and timekeepers' concrete offices on the tarmac, and the normal offices—all connected with the main hangar.

Perhaps the biggest improvement has been the taking over of the other half-bay for a workshop, so that, as one enters the Club hangar, one is not met by the sight of a number of machines in pieces. This side is reserved for serviceable aircraft. Repair work goes on beyond the partition. Three glassed-in rooms at the rear of the engine bay are used for "completes," and there is a well-arranged store along one side of the hangar. There is also a separate dope shop, electrically heated, while the foreman's office is elevated to command a complete view of both hangars. The repairs section is, incidentally, in care of Mr. Currie, who joined the Club in September last year.

In 1932 the whole organisation comprised two aircraft and a staff of four, while flying hours totalled some 700 in the year, and all repair work had to be sent to Brooklands. Now there are eleven machines, a staff of thirty-nine, and the flying hours for 1936 were over 2,500; some thirty machines are housed in the Club hangar, and a varying number in the workshops, where all repairs and overhauls are carried out both for the Club and for anyone else. Another addition is the sales department formed by Mr. G. B. Fellows, who has handed over his secretarial work to Mr. Drew.

The big change started in the middle of 1935, when the Club had outgrown itself as a branch of Brooklands, and those responsible for its growth formed their own company. Naturally a good deal of money had to be spent, but the results have justified the outlay. The next building plan, which is being put into operation immediately, is for living accommodation over the club rooms, while a large observation lounge will form part of the building over the tarmac offices, thereby commanding a full view of the aerodrome.

An Aero Club Appointment

THE increasing demands made on the air touring department of the Royal Aero Club have necessitated the appointment of an assistant to Comdr. Perrin, secretary, to deal solely with this side of the Club's activities, and the appointment of Sqn. Ldr. E. H. D. Spence, R.A.F.O., to this post took effect from March 1. Sqn. Ldr. Spence was in close touch with navigational problems and methods for some three years in the Department of the Director General of Civil Aviation, both at Gwydyr House and at Croydon Aerodrome, prior to taking up this appointment. The Club hopes that private owners desiring information on air navigation and touring abroad will take full advantage of the increased facilities now provided.

Sqn. Ldr. E. H. D. Spence.

THE OASES MEETING

Varying Fortunes in the Circuit and the Speed Race : British Participants Unlucky

Cairo, March 4.

THE Oases Meeting is over and has been pronounced a great success by everybody. The organisers have every reason to congratulate themselves as warmly as they have been congratulated. The weather was perfect and "a good time was had by all."

The conditions of the two events, the Oases Circuit and the Speed Race, were set out in last week's issue of *Flight*, when it was stated that 41 competitors in the Oases Circuit got away from Almaza, Airport of Cairo, safely. After a 1,300-mile flight 35 of the 41 completed the circuit. One was disqualified on account of a technical error.

The following, briefly, is the history of the six unfortunates who did not complete the course and of the seventh who completed it but was disqualified: (1) Prince Omar Halim, flying a Miles Hawk, damaged his undercarriage taking off from Hurgada; landing at Luxor proved too much and the undercarriage collapsed. (2) Karl Schwabe, flying a Klemm, had tyre trouble taking off from Dakla. His next stop, Baharya, was soft and an accident was practically inevitable. He very sportingly landed in the desert just outside the landing area so as to avoid creating an obstruction on an already tricky landing ground for competitors following him. He nosed over on landing, but fortunately was not hurt, and damage to his aircraft was reported to be slight. This was a really very sporting display. (3) A Zlin XII, piloted by Fuksa, had engine trouble at Dakla. (4) A Caudron 635, piloted by Wattine, had engine trouble at Luxor. (5) A Farman 402, flown by Gagey, also had engine trouble, but at Assuan. (6) Kutloch, flying a Baby Okypn, had some trouble getting off at Hurgada. He eventually forced-landing at Khozam, near Luxor, but luckily was found without any difficulty. The seventh, F. C. J. Butler (Hornet), had the bad luck to misunderstand his instructions for throwing out a message bag containing his number at the first turning point, Ghobit el Bos, and consequently had to be disqualified.

Through the Fence

The only other real excitement seems to have been provided by one of the Messerschmitts, which approached Hurgada under instead of over the already rather low telephone wires. The soft sand at Hurgada and Baharya, which was expected to give trouble, did not prove nearly so difficult, except perhaps to the Baby Okypn, which seemed to be used to something a little more solid underfoot.

The first home was Flt. Lt. Heber-Percy, who showed everybody that the D.H. Puss Moth is still a jolly good aeroplane. The winners of the Oases Circuit which, as explained last week, is a trial of efficiency taking into account petrol consumption, pay load, speed and equipment, were found by the formula to stand in the following order:—

	Aircraft.	Pilot.	Prize.
(1)	Junkers Ju.86	Freih Speck von Sternburg	£ E. 250 (and a cup)
(2)	Messerschmitt Taifun	Otto R. Thomsen	£ E. 200
(3)	Caudron Simoun	Guy Hansez	£ E. 150
(4)	Messerschmitt Taifun	President von Gronau	£ E. 100
(5)	Percival Vega Gull	P. G. Aldrich-Blake	£ E. 80
(6)	Percival Vega Gull	De Chateaubrun	£ E. 60
(7)	Zlin XII	Ambrus	£ E. 50
(8)	Leopard Moth / Caudron 635	Ahmed Salem / H. Lumière	£ E. 20 / £ E. 20

Before passing on to the Speed Race there are two other aspects of the Oases Circuit which might be mentioned. The marks awarded under Category "C," which dealt with such matters as the passengers' comfort, accessibility of the engine and

H. E. Mohamed Taher Pasha, president of the Royal Aero Club of Egypt (centre) with some of the officials of the meeting.

A Triton among the minnows: the Junkers Ju.86 (two 510/600 h.p. Jumo diesels) which took first place in the Circuit of the Oases—the general efficiency competition. On the right are the German crew.

(Right) Miss Loutfia el Nadi, the only Egyptian woman pilot to enter. She put up a good performance in a Hornet Moth.

(Left) Signor Zapetta (on right) with his companion and the Italian F.N. 305 monoplane which won the Speed Contest at 185 m.p.h.

airframe from a maintenance point of view, instruments, safety, provisions, etc., are rather interesting. The largest number of marks was obtained by one of the Messerschmitts, another of the same type securing second place. The third was gained by a Potez 560, the outstanding point in which was the parachute seats provided for all passengers and the special emergency hatch in the forward part of the cabin through which passengers could drop in the event of emergency. The fourth place was secured by the Junkers Ju.86, and the fifth by the Farman.

The other point concerned the large number of women who took part in the competition either as passengers or as active members of the crews. Outstanding performances were made by Miss Loutfia el Nadi, the only Egyptian woman to enter, and the Misses Glass, who put up an excellent show in their Gipsy Moth.

On Sunday, February 28, the Speed Race was run as a non-handicap affair open to any entrant who had completed the Oases Circuit. Seven went to the post, and the Italian F.N. 305 was a firm favourite. A race like this is very seldom exciting, and the favourite proved an easy winner. Three out of the seven competitors withdrew at various stages in the 300-miles course. The winner was said to have had a little oil trouble, and to those of us on the ground it certainly looked as if he came in over the finishing line throttled back. Whilst flying the course he seemed to be going very fast, and it is probable that his speed would have been well over 185 m.p.h. if he had not had this little trouble towards the end. The placings and prizes were as follows:—

Winners.	Aircraft.	Speed m.p.h.	Prizes.
G. Zapetta	F.N. 305	185	£E. 60 (and a cup)
Guy Hansez	Caudron Simoun ...	176	£E. 40
H. Lumiére	Caudron 635	171	£E. 30
Otto R. Thomsen	Messerschmitt Taifun	157	£E. 20

Once again the weather was perfect and there was a large attendance of distinguished people at Almaza. In the evening the Royal Aero Club of Egypt gave a dinner and dance at Heliopolis Palace Hotel, when the prizes were presented. H.E. Mohamed Taher Pasha presided, and everybody had a most happy evening. These seems little doubt that next year's event will attract an even bigger entry.

Specialised Components

UNDER the Air Ministry shadow scheme the Adamant Engineering Co., of Luton, is making a variety of aircraft parts for Saunders-Roe in particular and also for General Aircraft, Boulton Paul, Vickers and Blackburn.

A new plating shop has lately been installed, and all cadmium plating and anodising is carried out at the works. Of the thousands of Duralumin rivets made and anodised, every one is inspected for a cracked head or insufficient treatment.

An order on behalf of Saunders-Roe for 1,400 Irvin quick-release parachute attachments is being executed, together with a further order for fighting-harness links of stainless steel; these latter must be very highly polished to assure real stainlessness, for at edges, rough spots and scratches corrosion may begin in the same way as with mild steel.

The Adamant sparking-plug tester

There are two interesting items being produced for the Air Ministry by this firm, namely, a sparking plug tester, which is of Adamant design, and a Saunders-Roe bomb hoist. The plug tester has lately been ordered in increasing numbers, and incorporates a base board for six plugs, which are sparked under air pressure by a hand-operated magneto, a gauge indicating the operating pressure. The reflection of the spark is observed through a plate glass from a mirror set at 45 deg. Six dummy plugs, six plug adaptors and a plug spanner complete the equipment.

Bomb hoists, twelve in number, are being constructed for the Saro London to lift 500 lb. maximum weight to underwing racks. If more than 500 lb. weight is attached a ratchet device causes the drum to slip so that no damage can be done to the cable.

Electrical Testing Equipment

THE manufacture of electrical measuring and testing instruments previously produced by E. K. Cole, Ltd., and Marconi's Wireless Telegraph Co., Ltd., have been taken over by Marconi-Ekco Instruments Ltd., Electra House, Victoria Embankment, London, W.C.2, who are now in a position to supply additional literature regarding the latest instruments marketed.

Heavy-duty Storage Bins

GIVING details of their new system of unit-construction storage bins, a booklet has been issued by Painter Bros., Ltd., of Hereford, and of 60, Hillmarton Road, Caledonian Road, London, N.7.

The bins, made of heavy-duty British mild steel, galvanised with pure zinc, give 18 cu. ft. of storage space, or 16 cwt., in each compartment.

They are constructed on the multiple unit principle, in standard four-high units, for either single wall or back-to-back storage. Both types can be supplied with either open or closed backs.

Aircraft Photographs

A REMARKABLY comprehensive list of aeroplane photographs, covering the aircraft of many countries besides Great Britain, is issued by the Real Photographs Co., Cooper's Buildings, Church Street, Liverpool, 1.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS

CHANGES IN THE HIGHER COMMANDS

Air Marshal Sir Edgar Rainey Ludlow-Hewitt, K.C.B., C.M.G., D.S.O., M.C., to be Air Officer Commanding-in-Chief, Bomber Command, with effect from a date in September, 1937, vice Air Chief Marshal Sir John Miles Steel, K.C.B., K.B.E., C.M.G.

Air Marshal Sir Frederick William Bowhill, K.C.B., C.M.G., D.S.O., to be Air Officer Commanding-in-Chief, Coastal Command, in the autumn of 1937, vice Air Marshal Philip Bennet Joubert de le Ferté, C.B., C.M.G., D.S.O.

Air Marshal Philip Bennet Joubert de la Ferté to be Air Officer Commanding, Royal Air Force, India, in the autumn of 1937, vice Air Marshal Sir Edgar Rainey Ludlow-Hewitt, K.C.B., C.M.G., D.S.O., M.C.

Air Marshal Sir Edgar R. Ludlow-Hewitt was appointed to the Royal Flying Corps from the Royal Irish Rifles in August, 1914. He served in France from March, 1915, with intervals, until the end of the war and besides receiving the C.M.G., D.S.O., and the M.C., was on a number of occasions mentioned in despatches. He was granted a permanent commission in the Royal Air Force with the rank of Wing Commander in 1919 on resigning his Army commission.

Subsequently he was employed at the Air Ministry for several years and in turn held the posts of Deputy Director of Training and Organisation, Air Secretary to the Secretary of State for Air, and President of the Aerodrome Board. He was Air Aide-de-Camp to His Majesty King George V during 1921-23. From May, 1926, to September, 1930, he was Commandant of the Royal Air Force Staff College and in the Birthday Honours List, 1928, was appointed to a Companionship of the Order of the Bath. In October, 1930, he was appointed Air Officer Commanding, Iraq Command. In January, 1933, he was promoted Knight Commander of the Order of the Bath and in February, 1933, he was appointed Director of Operations and Intelligence and Deputy Chief of the Air Staff at the Air Ministry. Since March, 1935, he has commanded the Royal Air Force in India. He was promoted to Air Commodore in 1923, to Air Vice-Marshal in 1930, and to his present rank in 1934.

Air Marshal Sir Frederick W. Bowhill was born in India in 1880 and educated at Blackheath School and in H.M.S. *Worcester*. For many years a midshipman and an officer in the Royal Naval Reserve, he was appointed a flying officer in the Royal Flying Corps (Naval Wing) in April, 1913, having graduated as a pilot in January of that year (Royal Aero Club Certificate No. 397).

Air Marshal Bowhill served with distinction, both at home and overseas, in the Royal Naval Air Service. His commands included the Aircraft Carrier *Empress*, whose seaplanes took part in the raid on Cuxhaven on Christmas Day, 1914, and, in 1916, the Air Unit with the military forces in East Africa, which he took from Mesopotamia. Shortly after the formation of the Royal Air Force in 1918 he was appointed to command No. 62 Wing in the Mediterranean, and while holding this post conducted air operations based on Petrousk on the Caspian Sea. For his services during the war and after he received the C.M.G. and the D.S.O. and bar, and in addition was mentioned in despatches no fewer than seven times.

In 1919 he was given a permanent commission as a Wing Commander in the Royal Air Force, and later the same year was appointed Chief Staff Officer to the secret "Z" expedition which proceeded to Somaliland against the Mad Mullah, who had been active against the British Administration for many years. Subsequently Air Marshal Bowhill served in Egypt and Iraq. A year later he was appointed Director of Organisation and Staff Duties at the Air Ministry, and in May, 1931, he became Air Officer Commanding, Fighting Area, Air Defence of Great Britain. In July, 1933, he was appointed Air Member for Personnel on the Air Council, and was appointed a C.B. in June, 1935, and a K.C.B. in January, 1936. He was promoted to the rank of Air Commodore in 1928, to Air Vice-Marshal in 1931, and to his present rank in 1936.

Air Marshal Joubert de la Ferté joined the Royal Flying Corps from the Royal Artillery in 1913, having previously obtained the Royal Aero Club's aviators' certificate (No. 280, granted September 3, 1912). During the war he served in France, Egypt and Italy, and was in command of the Royal Air Force in the latter country. For his war services he received the C.M.G. and D.S.O., and was many times mentioned in despatches. He received the C.B. in the Birthday Honours List, 1936.

He was given a permanent commission in the Royal Air Force as a Wing Commander in 1919 on resigning his Army commission. After the war he became an instructor at the Royal Air Force Staff College and also served as Deputy Director of Personnel and Deputy Director of Manning at the Air Ministry. In September, 1926, he was posted for duty as Royal Air Force Instructor at the Imperial Defence College and on relinquishing this post in December, 1929, was appointed to Command No. 23 Group, Inland Area, subsequently becoming Commandant of the Staff College in September, 1930. In January, 1934, he was appointed to command Fighting Area, now renamed No. 11 (Fighter) Group, and since September, 1936, he has been Air Officer Commanding-in-Chief, Coastal Command. He was promoted to the rank of Air Vice-Marshal on January 1, 1933, and to his present rank on July 1, 1936.

ROYAL AIR FORCE COLLEGE

The following Flight Cadets successfully completed on December 18, 1936, their course of training at the Royal Air Force College, Cranwell. The names are arranged in alphabetical order:—

Ault, K., Barthold, B., Bennett, D. E., Browne, P. E. S. F. M., Bufton, H. E. (Winner of Abdy Gerrard Fellowes memorial prize), Burton, H. F. (Winner of Sword of Honour), Calnan, T. D., Cooper, L. F., Coulson, S. P., Cox, M. H., Duke-Woolley, R. M. B. D., Edwards, R. S. J., Fawdry, I. J., Ffrench-Mullen, D. A., Fraser, J. G., Harding, N. C., Harris, W. A., Jackson, A. D., Lowden, L. W., McConnell, R. H. (Winner of Air Ministry prize for imperial and war studies), Menaul, S. W. B., Milne, C. D. (Winner of H.M. the King's Medal, the Air Ministry prize for aeronautical engineering and the J. A. Chance memorial prize), Pearson, M. C., Powell, G. S.ff., Robinson, G. P., Rowland, I. T. B. T., Soden, I. S., Vaughan Williams, A. R., Weston Burt, D., Wilson, L. D. (Winner of R. M. Groves memorial prize).

UNIVERSITY CANDIDATES FOR PERMANENT COMMISSIONS

The undermentioned University candidates have been selected for appointment to permanent commissions in the General Duties Branch of the Royal Air Force:—

J. H. Barrett (Cambridge), N. M. Bayliss (Liverpool), A. G. H. Bell (Oxford), B. C. Bell (Cambridge), G. P. Harger (Oxford), A. T. Irvine (Oxford), F. C. Phipps (Cambridge), H. F. Thomson (Cambridge), E. M. Ware (London).

A SCHOLARSHIP AT CRANWELL

The Air Ministry announces that the Court of the Worshipful Company of Ironmongers have generously undertaken to provide funds, during their pleasure, for the award of a scholarship annually to the value of £50, tenable at the Royal Air Force College, Cranwell. This offer, which is intended to assist cadets who are sons of officers or airmen of the Royal Air Force (including personnel seconded to the Royal Air Force), or of the air forces of the Dominions or Colonies, has been gratefully accepted by the Air Council.

The Scholarship will be known as "The Ironmongers' Company's Scholarship." It will be awarded annually to a candidate selected by the Air Council and approved by the Worshipful Company of Ironmongers from among those cadets who have competed successfully at the examinations for entry to the Royal Air Force College, and whose circumstances render them eligible for the award.

The first Scholarship is now available and has been awarded to Flt. Cadet E. A. Johnston, who entered the Royal Air Force College in September, 1936.

R.A.F. STATION, WYTON

The R.A.F. Station, Wyton, together with the units at that station, were transferred within the Bomber Command to No. 2 (Bomber) Group, on March 1.

FORTHCOMING SQUADRONS

The Air Ministry has published the following programme of new squadrons which are to be formed during the present month:—

No. 44 Medium Bomber at Wyton, No. 51 Heavy Bomber at Driffield, No. 61 Medium Bomber at Hemswell, No. 75 Heavy Bomber at Driffield, No. 76 Heavy Bomber at Finningley, No. 79 Fighter at Biggin Hill, No. 80 Fighter at Kenley, No. 90 Medium Bomber at Bicester, No. 213 Fighter at Northolt, No. 217 General Reconnaissance at Boscombe Down, and No. 226 Medium Bomber at Upper Heyford. The last-named will move to Harwell in April.

THE ULSTER SQUADRON

It is proposed to form a Territorial Army and Air Force Association in Co. Antrim, following on which No. 502 (Ulster) (Bomber) Squadron will be converted from a Special Reserve to an Auxiliary Air Force unit.

No. 10 SQUADRON DINNER

The tenth annual reunion dinner of No. 10 Squadron will be held in London on March 20. It is open to all ranks. Tickets 5s. 6d. Past and present members of the Squadron are asked to apply to Mr. A. F. Williams, "Rozel," Amersham, Bucks.

ROYAL AIR FORCE GAZETTE

London Gazette, February 2, 1937

General Duties Branch

The following are granted short service commissions as Pilot Officers for five years on the active list with effect from and with seniority of February 19:—J. W. Allsop, D. G. Boehm, J. F. P. Brough, D. A. Cameron, R. J. Cosgrove, H. N. Fowler, C. L. Gilbert, D. C. F. Good, G. E. Grey Smith, P. C. Hughes, C. L. Hullock, L. L. Johnston, K. W. Kaufmann, C. R. Kelaher, W. Kinane, C. R. Mace, D. Marshall, C. G. C. Olive, J. Paine, R. M. Power, A. E. Robinson, K. R. Rogers, D. F. B. Sheen, W. B. Wight, E. W. Yates.

Flt. Cadet I. T. B. Rowland, having successfully passed through the Royal Air Force College, Cranwell, is granted a permanent commission as Pilot Officer with effect from and with seniority of December 19, 1936. (Substituted for the notification in the *Gazette* of January 26.) E. J. T. Clarke is granted a short service commission as Acting Pilot Officer on probation with effect from and seniority of January 25. (Substituted for the notification in the *Gazette* of February 9.)

The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers on the dates stated:—R. J. Abrahams, D. E. Bell, D. H. Cross, J. Gillan, B. P. Hart, S. J. Monroe, I. G. C. Malcolm, J. A. Mackie, J. L. Nicol, E. F. Pope, C. A. Stephen, W. K. Williams (January 27); N. G. Cooke, M. V. Longbottom, C. D. Swain, E. C. Wolfe (February 24).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—J. N. McAuley, S. Keane (April 1, 1936) (substituted for notifications in the *Gazette* of June 23, 1936); C. G. Hill (Lt., The Buffs); A. C. Weldon (Lt., Sherwood Foresters); L. I. T. Whitaker (Lt., Rifle Brigade) (seniority October 1, 1935) (October 1, 1936); A. A. N. Malan (Lt., Royal Tank Corps), R. B. Pakenham (Lt., Border Regt.), A. F. Anderson (Lt., Royal Warwick Regt.) (seniority January 15, 1936) (January 15); K. Gray (January 15); N. W. Wakelin (February 12); G. C. Tomlinson, A. J. Kennedy (February 14).

F/O. D. M. Newman takes rank and precedence as if his appointment as Flying Officer bore date December 22, 1936. Reduction takes effect from January 23; Cdr. F. M. R. Stephenson, R.N., Squadron Leader, R.A.F., ceases to be attached to the Royal Air Force with effect from February 11, on return to Naval duty, and is reattached to the Royal Air Force as a Squadron Leader with effect from February 23 and with seniority of April 1, 1935; Lt. R. W. Wicks, R.N., is reattached to the Royal Air Force as a Flt. Lieutenant with effect from February 19 and with seniority of January 1, 1934; Lt. D. McI. Russell, R.N., Flight Lieutenant, R.A.F., ceases to be attached to the Royal Air Force on return to Naval duty (January 4); Wing Cdr. M. Moore, O.B.E., is placed on the half-pay list, scale B, from February 17 to 20 inclusive; Wing Cdr. W. Helmore is placed on the retired list at his own request (March 1); Flt. Lt. W. H. Forbes Mitchell is transferred to the Reserve, Class A (March 1); P/O. D. H. G. Tollemache resigns his permanent commission (January 4); the short service commission of Acting Pilot Officer on probation H. W. McMillan is terminated on cessation of duty (February 24).

Memorandum

61444 Cadet A. E. P. Roberts is granted an honorary commission as 2nd Lieutenant with effect from the date of his demobilisation.

PRINCESS MARY'S ROYAL AIR FORCE NURSING SERVICE

Sister Miss E. L. Elias resigns her appointment (March 1).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

R. D. Adams is granted a commission as Flying Officer in Class A (March 2); Major H. R. Kavanagh, M.B.E. (R.A.R.O.), is granted a commission as Flight Lieutenant in Class C (November 30, 1936); Sqn. Ldr. E. L. P. Morgan, R.A.F. (Retired), is granted a commission as Flight Lieutenant (Honorary Squadron Leader) in Class C (December 21, 1936); Capt. A. L. Cockburn is granted a commission as Flight Lieutenant in Class C (January 20); F/O. G. E. Pyne, R.A.F. (Retired), is granted a commission as Flight Lieutenant in Class C (August 4, 1936); F/O. R. F. de R. Read is granted a commission as Flight Lieutenant in Class C (January 25); F/O. R. A. Whitehead is transferred from Class A to Class C (November 18, 1936); F/O. L. B. Greensted is transferred from Class AA (ii) to Class C (June 19, 1936); F/O. A. E. Hill is transferred from Class C to Class A (July 18, 1936); the notification in the *Gazette* of March 17, 1936, concerning F/O. L. E. Falla is cancelled; the honorary rank of Flight Lieutenant granted to F/O. D. M. Harrison is withdrawn on termination of his employment with the Royal Air Force (January 5); F/O. A. S. Wilcockson relinquishes his commission on completion of service and is permitted to retain his rank (February 19).

The following relinquish their commissions on completion of service on the dates stated:—Flt. Lt. A. G. D. Alderson (January 25); F/O. C. E. Kelly (October 14, 1936); F/O. W. R. C. Wilkins (December 30, 1936).

AUXILIARY AIR FORCE

General Duties Branch

No. 603 (CITY OF EDINBURGH) (BOMBER) SQUADRON.—F/O. G. A. Reid is promoted to the rank of Flight Lieutenant (November 25, 1936).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captain.—R. L. G. Marix, D.S.O., to Headquarters, No. 16 (Reconnaissance) Group, Lee-on-the-Solent; for duty as Senior Air Staff Officer, 1.2.37.

Wing Commanders.—A. O. Lewis-Roberts, D.F.C., to R.A.F. Station, Hemswell; to command, 22.2.37. H. V. Rowley, to Directorate of Operations and Intelligence, Air Ministry, 22.2.37.

Squadron Leaders.—A. F. Scrogqs, to Deputy Directorate of Repair and Maintenance, Air Ministry, 16.2.37. C. S. Shaw, to Directorate of Training, Air Ministry, 22.2.37. E. C. de V. Lart, to No. 142 (Bomber) Squadron, Andover, 22.2.37. J. E. G-H. Thomas, D.F.C., to No. 228 (Flying Boat) Squadron, Pembroke Dock; for flying duties, 15.2.37.

Flight Lieutenants.—A. P. S. Wills, to Headquarters, Training Command, Market Drayton, 15.2.37. A. N. Luxmoore, to Electrical and Wireless School, Cranwell, 24.2.37. G. P. Woodhouse, to No. 26 (Army Co-operation) Squadron, Catterick, 18.2.37. A. C. Evans-Evans, to R.A.F. Station, Scampton, 19.2.37.

Flying Officer.—I. J. McGhie, to R.A.F. Station, Hal Far, Malta, 4.2.37. F. Rump, to School of Air Navigation, Manston, 22.2.37. F. J. Manning, to No. 269 (General Reconnaissance) Squadron, Abbotsinch, 21.2.37.

Acting Pilot Officers.—G. R. Brady, D. D. Rogers, to No. 18 (Bomber) Squadron, Upper Heyford, 21.2.37. R. B. Langlois, to No. 21 (Bomber) Squadron, Lympne, 21.2.37. H. R. Bickerstaff, to No. 29 (Fighter) Squadron, North Weald, 21.2.37. D. C. Stapleton, to No. 34 (Bomber) Squadron, Lympne, 21.2.37. D. T. St. H. Dawes, A. A. Devany, to No. 41 (Fighter) Squadron, Catterick, 21.2.37. H. D. Card, to No. 49 (Bomber) Squadron, Worthy Down, 21.2.37. S. Gemmell, to No. 54 (Fighter) Squadron, Hornchurch, 21.2.37. R. S. Illingworth, T. G. Robertson, to No. 74 (Fighter) Squadron, Hornchurch, 21.2.37. S. G. Cooper, J. Ellis, to No. 114 (Bomber) Squadron, Wyton, 21.2.37. A. M. McKenzie, A. C. MacLachlan, H. G. Marriott, to No. 139 (Bomber) Squadron, Wyton, 21.2.37. W. S. L. Smallman, to No. 142 (Bomber) Squadron, Andover, 21.2.37. J. B. J. Boardman, G. F. Rodney, G. E. Saddington, to No. 144 (Bomber) Squadron, Hemswell, 21.2.37. F. T. May, E. T. Williams, to No. 207 (Bomber) Squadron, Worthy Down, 21.2.37. J. Avent, to No. 269 (General Reconnaissance) Squadron, Abbotsinch, 21.2.37.

Equipment Branch

Group Captain.—C. L. Archibold, O.B.E., to Headquarters, Coastal Command, Lee-on-the-Solent; for Equipment Staff duties, 18.2.37.

Wing Commander.—H. L. Woolveridge, to Directorate of Equipment, Air Ministry, 18.2.37.

Flying Officer.—R. J. Williams, to R.A.F. Station, Hawkinge, 23.2.37.

Accountant Branch

Squadron Leader.—F. C. Chalmers, to No. 1 Flying Training School, Leuchars; for Accountant duties, 22.2.37.

Flight Lieutenant.—V. H. Lewis, to No. 9 Flying Training School, Thornaby, 22.2.37.

Medical Branch

Squadron Leader.—R. L. C. Fisher, to Superintendent of the Reserve, Hendon; for duty as Medical Officer, 23.2.37.

Flight Lieutenants.—D. Breen (Quartermaster), to R.A.F. Hospital, Aden, 1.2.37. R. E. W. Fisher, to R.A.F. Station, Aldergrove, 20.2.37.

Flying Officers.—J. G. Rountree, to No. 5 Armament Training Camp, Penrhos, 20.2.37. A. R. Sibbald, to R.A.F. Depot, Uxbridge, 24.2.37.